PROFILE PUBLICATIONS

The Sopwith 1½ Strutter

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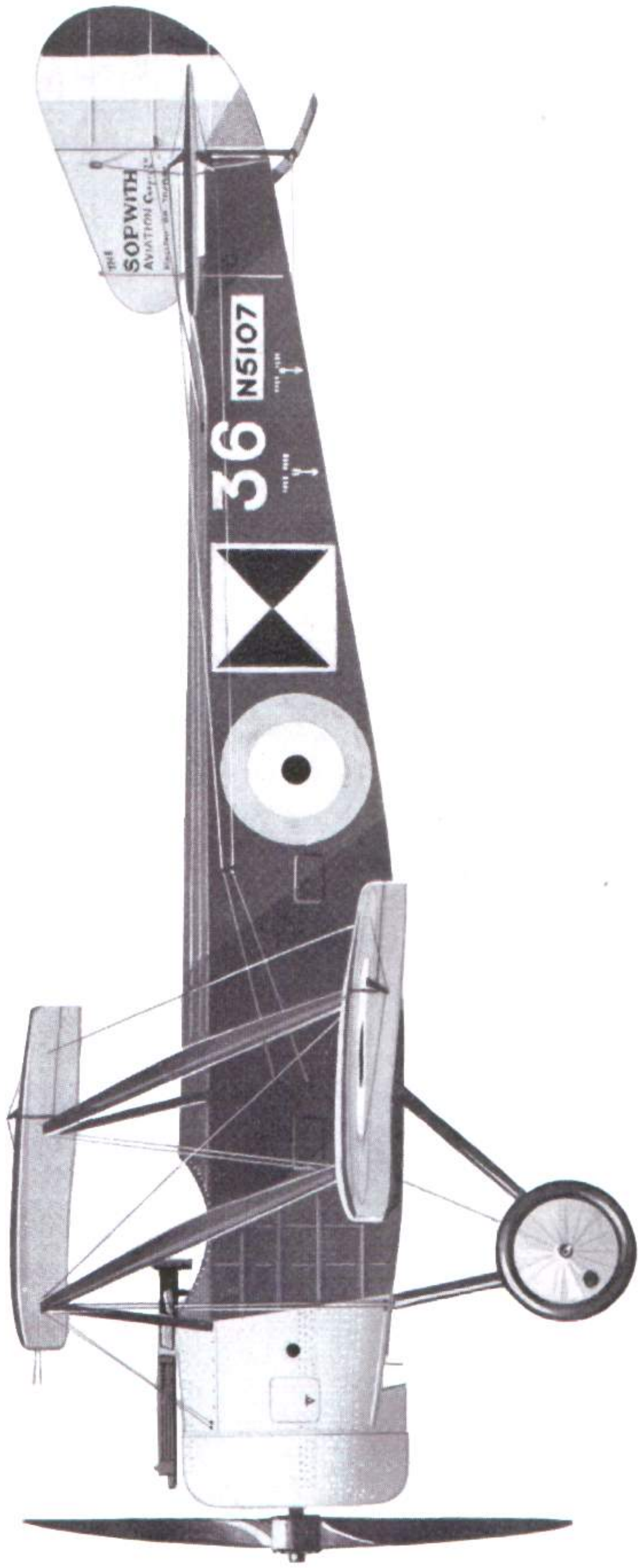

1½ Strutter, No. 3 Wing, R.N.A.S., Luxeuil-les-Bains, France, 1916.

1½ Strutter, No. 70 Squadron, R.F.C., 1916.

1½ Strutter, No. 43 Squadron, R.F.C. 'A' Flight aircraft.

1½ Strutter, No. 43 Squadron, R.F.C. 'B' Flight aircraft.

1½ Strutter, No. 43 Squadron, 'C' Flight aircraft.

1½ Strutter, single-seat bomber, No. 3 Wing, R.N.A.S., Luxeuil-les-Bains, France, 1916.

1½ Strutter single-seat bomber, No. 2 Wing, R.N.A.S. Aegean area.

1½ Strutter single-seat night fighter, No.78 Squadron, R.F.C. Sutton's Farm, U.K., 1917.

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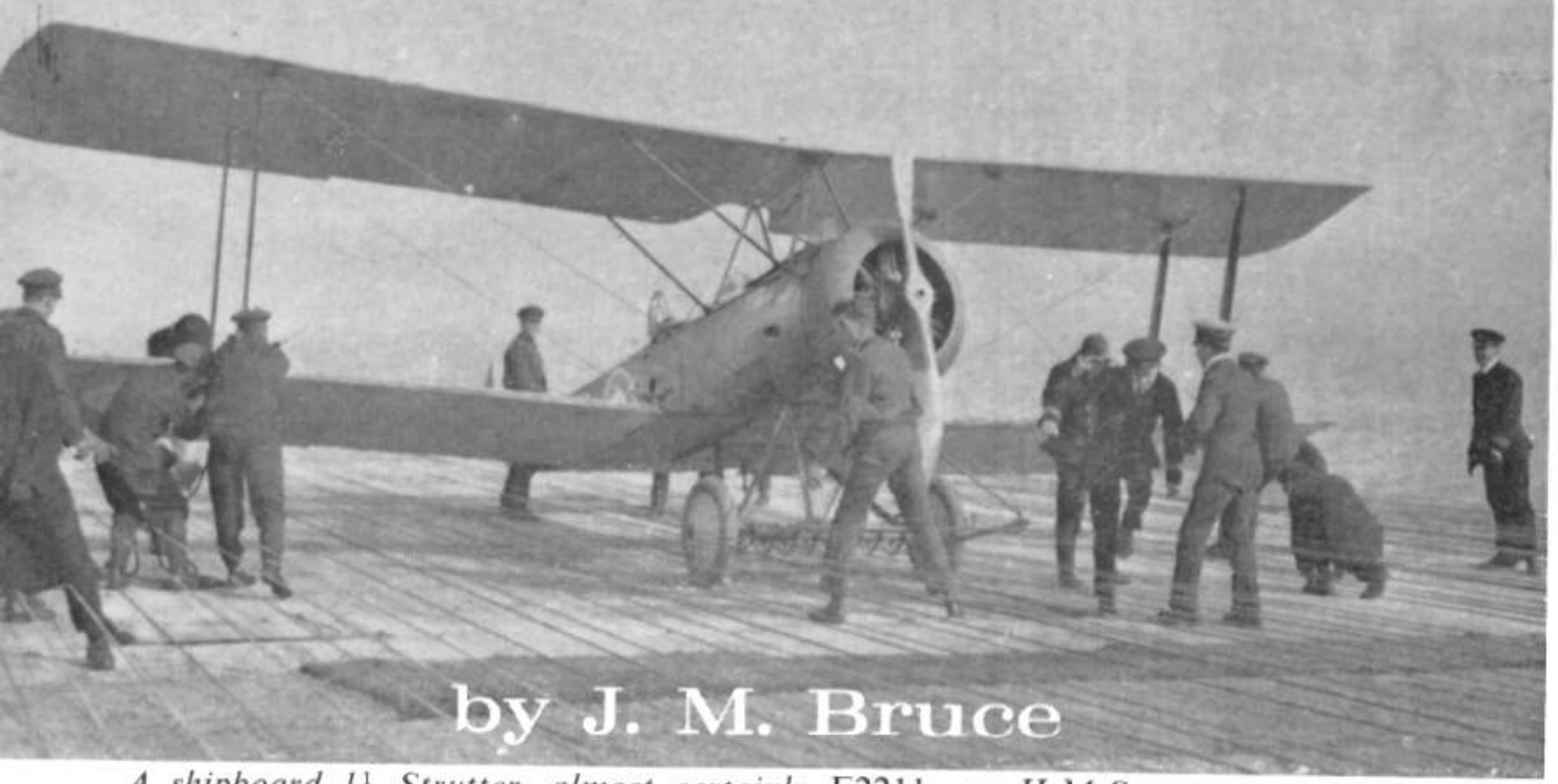
The Sopwith 1½ Strutter



by J. M. Bruce

A shipboard 1½ Strutter, almost certainly F2211, *on H.M.S.* Argus, *October 1918. It has a row of clip-hooks on the underside of the undercarriage spreader bar and an airscrew guard. This illustration shows clearly how seriously the fore-and-aft arrester cables impeded the movements of the members of deck handling parties.*

(Photo: Trustees of the National Maritime Museum)

The history of the Sopwith biplane that came to have the quaint name of One-and-a-half Strutter includes two unusual features. Of all the major types of the 1914-18 war it was the first to be built in much larger numbers abroad than in its country of origin; this was a distinction it was to share with the D.H.4 (*Profiles* Nos. 26 and 97) and possibly with the Hanriot HD-1 (*Profile* No. 109), to which it bestowed its upper wing bracing arrangement.

Secondly, at a time when close security precautions were observed in most matters relating to new aircraft an extraordinary lapse occurred in the case of the 1½ Strutter, for a photograph of an example of the type was published a few days before it entered operational service. On 8th April 1916 Harry Hawker, the Sopwith test pilot, visited Hendon in the new aircraft, probably an R.N.A.S. machine of the first production batch. The visit was chronicled in the issue of *Flight* for 13th April 1916:

> "Harry Hawker, with a passenger, paid a flying visit to the aerodrome on the new two-seater Sopwith "bullet", and showed what his mount could do in the way of speed and slow landing—and very good too it was."

A photograph of the Sopwith in flight appeared in the next issue of that journal, the aircraft again being referred to as "the two-seater Sopwith "Bullet".

The prototype of the new Sopwith aircraft had been built for the Admiralty and was completed in December 1915. It was a two-seater, and was allotted the official serial number *3686*; its engine was a 110-h.p. Clerget 9Z. Among its predecessors in the Sopwith company's products were a number of earlier tandem two-seaters. One of these was a small biplane, powered by an 80-h.p. Gnome engine, that was designed in December 1914. This two-seater set up a British altitude record on 6th June 1915, when Harry Hawker flew it to a height of 18,393 feet. This was a remarkable performance on the somewhat nominal 80 h.p. produced by the Gnome and in view of the ingenuity that had to be exerted to get the aircraft's centre of gravity into the right place. The aircraft had a span of only 31 ft. 6 in.; its wing area was 298 sq. ft.

This 80-h.p. biplane was known as the "Sigrist Bus", its conception being attributed to the late Fred Sigrist. It is worth noting, however, that the design drawing of the aircraft bore the signature of Herbert Smith, who was to design all the later Sopwith types. It was a rather undistinguished little aeroplane, but it was characterized by an unusual system of struts supporting the upper wing. There was no upper centre section: the wing was in two halves that met at a trestle-shaped cabane, and additional struts ran from the upper longerons to the spars of the upper wing. Thus the wing was supported by two parallel systems of W-struts.

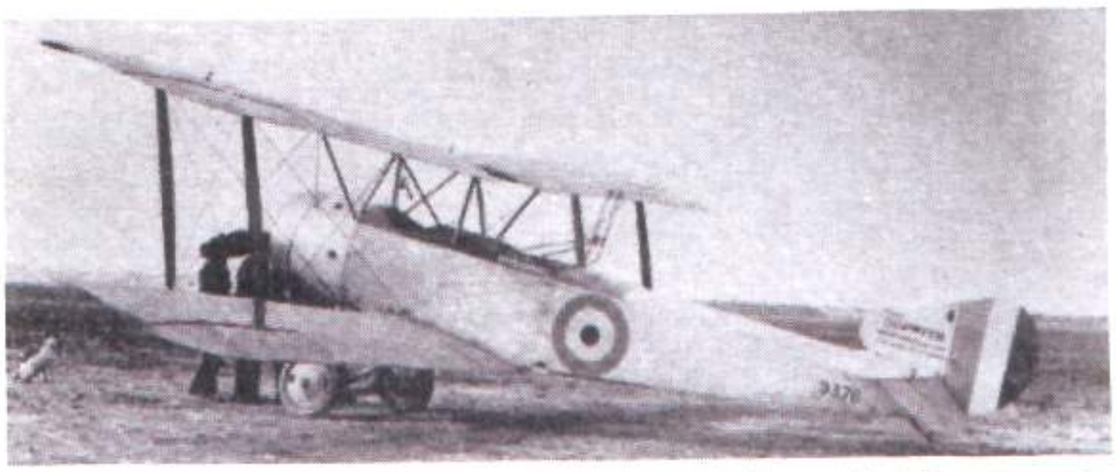
Herbert Smith designed the new Clerget-powered two-seater for the Admiralty; it was the first of a long line of military aircraft that were to bear his unmistakable stamp. The one structural feature that it inherited from the Sigrist Bus was the W-strut bracing for the upper wings, and it was from this feature that the aircraft's unusual name was derived. Soon after its appearance the story was invented that the Sopwith should really have been a two-bay biplane but was instead fitted only with half-struts between the upper wings and upper longerons: thus it came to be known as the One-and-a-half Strutter.

Needless to say, the name was unofficial at first, but it seemed not to attract the official strictures that were applied in the case of the Sopwith Pup (see *Profile* No. 13), for it was soon in use in official publications. When first introduced into service with the R.F.C. the aircraft was known officially as the Sopwith Two-seater. The Admiralty had at that time a system of naming aircraft types from the serial number of a typical aircraft, usually one of the first production batch. In the case of the 1½ Strutter No. *9400* was selected, and in the R.N.A.S. the two-seat version of the aircraft was officially designated Sopwith Type 9400.

The first production batch of fifty had been ordered by the Admiralty from the Sopwith company; the serial numbers *9376—9425* were allotted. The first 1½ Strutter of this batch was at Brooklands in February 1916. The prototype, *3686*, saw service with the War Flight at R.N.A.S. Eastchurch in the early spring of 1916.

In its construction the 1½ Strutter was conventional. The fuselage had spruce longerons and spacers, and was braced by wire to form the usual box girder. In the side bays immediately behind the engine there was a substantial lozenge-shaped diagonal member; the short side fairings behind the engine consisted of plywood formers and light spruce stringers. The bay immediately behind the engine had sheet-aluminium panels, and the top decking about the cockpit was of plywood; all other covering was of fabric.

The mainplanes were mostly of wood with steel-tubing tips and trailing edges. Although the upper wing was made in two halves meeting at the central cabane, the lower panels were attached to a centre section, the spars of which passed through the fuselage. The trailing portions of this lower centre section consisted of movable panels pivoted at about one-



Left: *The first production 1½ Strutter*, 9376, *with Nieuport ring mounting on the rear cockpit. This aircraft had a long and varied career. It was used by No. 5 Wing, R.N.A.S., was obliged to land in Holland on 22nd April, 1917, and was written off the strength of No. 5 Wing on 11th May.* (Photo: via K. M. Molson). Right: *After its internment in Holland* 9376 *was bought on 23rd September 1917 by the Dutch government for £1,700 and became LA-42 of the Luchtvaart Afdeling, as seen here. By that time the aircraft had been fitted with Vickers gun and Scarff No. 2 Ring Mounting.* (Photo: via F. Gerdessen)

Left: *Westland-built two-seat 1½ Strutter* N5624 (Photo: Harald Penrose, O.B.E., F.R.Ae.S.). Right: *Westland-built 1½ Strutter single-seat bomber with transparent panels in upper wing.* (Photo: Harald Penrose)

third of their chord on a spanwise axis. These surfaces could be rotated upwards through 90 deg. to stand flat against the airstream and act as air brakes. Their offset axis provided them with a degree of aerodynamic balancing. These air brakes were actuated by a handwheel in the pilot's cockpit.

A tailplane of generous size was fitted; it was of composite construction. The elevators were made entirely of steel tubing, as were the fin and rudder. An innovation introduced on the 1½ Strutter was the adjustable tailplane, the incidence of which could be varied in flight. The main fuel tanks were mounted within the fuselage directly above and between the spars of the lower centre section. This resulted in the crew's cockpits being relatively far apart: the pilot sat under the upper wing, where he had a good view forwards and downwards but little upward view; the observer was well aft of the wings and had an excellent field of fire for his Lewis gun. The elevator cables were taken upwards from the control shaft in the pilot's cockpit to a pair of fairleads on the outside of the upper longerons beside the observer's cockpit. This made the cables accessible to the observer and thus gave him a minimal emergency control in the event of his pilot being incapacitated, for there was no dual control within the rear cockpit.

It seems possible that the Sopwith 1½ Strutter may have been ordered in quantity before suitable armament had been evolved for it. No doubt some kind of movable mounting on the rear cockpit for a Lewis gun was always envisaged, but when the 1½ Strutter was designed there could have been little certainty that a British mechanism to enable a machine gun to be fired through the revolving airscrew of a tractor aircraft would be successfully developed in time for large numbers of production 1½ Strutters.

Although gun-synchronizing mechanisms had been patented or tested in Germany, France, Russia and even Great Britain itself before the outbreak of war, it needed the goad of the Fokker monoplane fighter (see *Profile* No. 38) to convince the British authorities that a device of this kind was a necessity: clearly the pusher types that permitted the use of a forward-firing gun would be no match for the cleaner, faster tractor aircraft armed with synchronized guns.

Fortunately for the 1½ Strutter several synchronizing mechanisms became available at the critical moment. The first of these were the Scarff-Dibovsky and Vickers-Challenger gears. Lt. Cmdr. V. V. Dibovsky of the Imperial Russian Navy, who had first made a synchronizing mechanism in November 1914, submitted his ideas to the Royal Naval Air Service in January 1916. Warrant Officer F. W. Scarff, a gunner on the staff of the Admiralty Air Department, quickly designed a mechanism embodying Dibovsky's ideas. The product was known as the Scarff-Dibovsky gear, and was standardized for the 1½ Strutters used by the R.N.A.S.

Vickers Ltd. had begun to study the possibility of making a synchronizing device in November 1915. In the following month the first Vickers gear, designed by G. H. Challenger, was built and was tested successfully. It was put into production, but its application to British aircraft was delayed for some weeks because the army's demands for Vickers guns were as much as existing production capacity could cope with. By February 1916 production of the guns had increased sufficiently to enable some to be supplied for aircraft use.

Nine 1½ Strutters of No. 5 Wing, R.N.A.S., at Coudekerque; five are two-seaters, the remainder single-seat bombers. Three of the single-seaters have a Lewis gun above the upper wing.

The first unit to have the 1½ Strutter was No. 5 Wing, R.N.A.S. at Coudekerque, which on 24th April 1916 received the first of the type to be delivered for operational use. It made its first offensive patrol on the following day, piloted by Flt. Sub-Lt. R. R. Soar with Flt. Sub-Lt. F. Potts as observer. No. 5 Wing had a complete flight of Sopwiths by the end of April 1916. These 1½ Strutters were at first used as fighting escorts for the Breguet Type V and Caudron G.IV bombers that formed the main equipment of the Wing. No. 5 Wing went on to use 1½ Strutters as bombers with a good measure of success; the unit's Sopwiths included several of the single-seat version described below. Targets included the Tirpitz and Hindenburg batteries, the Hoboken shipyards, the Lichtervelde ammunition dump, and several enemy aerodromes.

From the outbreak of war the Admiralty had wanted to make long-distance bombing raids on naval and military centres in German territory. By the Spring of 1916 the Short bomber and the 1½ Strutter had become available and attacks of this kind became a possibility. Although much smaller and lighter than the big Short, the 1½ Strutter had a considerable fuel capacity and was potentially a long-range aircraft.

To exploit the Sopwith's capability further, a single-seat version was evolved. The rear cockpit was eliminated and internal stowage for four 65-lb. bombs was provided. The bombs were carried horizontally in the bottom of the fuselage. Two pairs of bomb doors were fitted to the underside; these opened under the weight of the falling bombs and were pulled shut again by lengths of rubber shock-absorber cord. Two small inspection doors were provided in each side of the fuselage, one to each bomb bay.

The bomber variant of the 1½ Strutter was given the official Admiralty designation Sopwith 9700. The second Sopwith-built batch (*9651-9750*) included thirty-five single two-seaters, possibly in service. Similarly, several single-seat 1½ Strutters (e.g. *N5119*, *N5161*, *N5168*, *N5204* and *N5213*) were converted into two-seaters.

Early in May 1916 Captain W. L. Elder, R.N., was sent to France to make arrangements for the arrival of the new R.N.A.S. bombing Wing, for which the title No. 3 Wing was revived. The R.N.A.S. plans envisaged a Wing strength by 1st July of fifteen Short and twenty 1½ Strutter bombers, with twenty 1½ Strutter fighters for escort purposes. The ultimate planned strength was to be 100 aircraft.

The creation of No. 3 Wing, R.N.A.S., in the spring of 1916 was a landmark in the history of military aviation, for it was the first strategic bombing force ever formed. This fact may require to be re-emphasized in 1966, when at least one new work tends to give the impression that strategic bombing was a German concept.

N5116, *a Sopwith 9700 of No. 3 Wing, R.N.A.S., Luxeuil-les-Bains, with its bomb doors open and port rear access panel in use.* (Photo: Imperial War Museum Q68078)

But that spring of 1916 was a time of preparation elsewhere in France. The great offensive in the Somme area was being planned, and an appraisement of the Royal Flying Corps' strength had shown that it was short by twelve squadrons of the number of aircraft necessary to give the ground forces the support they needed. An urgent plea for more aircraft was made by General Trenchard. As a survey of home units of the R.F.C. produced only twelve aircraft with adequate performance for operational use the only remaining source of aircraft was the R.N.A.S.

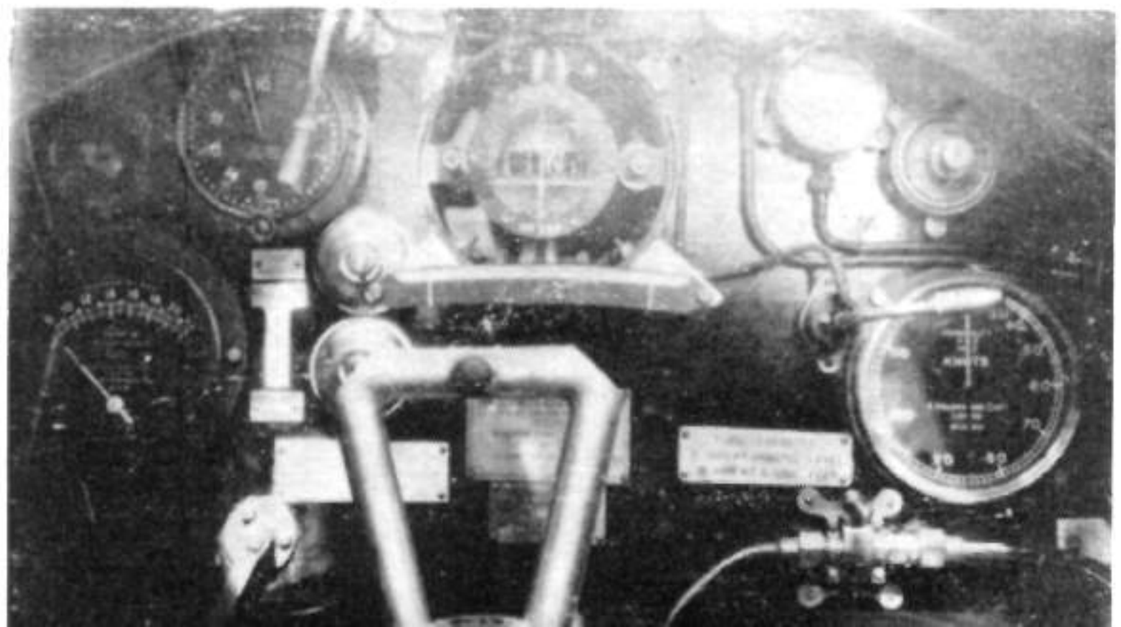
> "The Admiralty could only respond at the expense of their new bombing wing. Anxious as they were to strike a blow at German munition centres, they realized the urgency of the Flying Corps demands and agreed to hand over at once a number of Sopwith two-seaters: by the middle of September 1916 they had transferred no less than sixty-two of this type."*

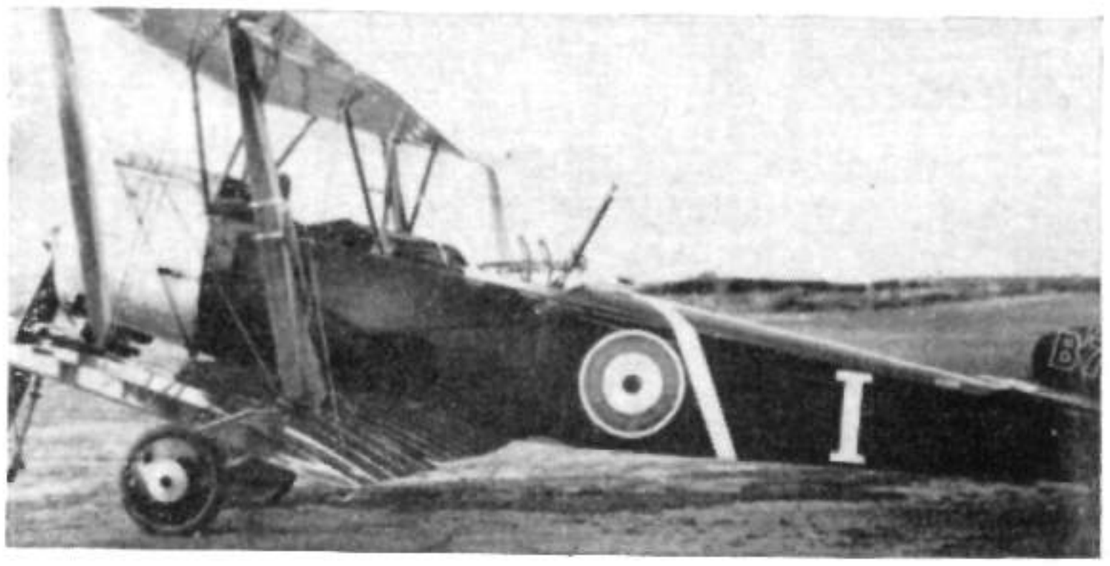
If all the dates quoted in the official history are correct, Capt. Elder must have known when he went to France in May 1916 that the Admiralty had agreed to hand over some of its 1½ Strutters to the R.F.C., and that several had in fact been transferred before the end of April. These transfers cannot have been made at the expense of a No. 3 Wing that did not at that time have an operational existence, for Air Vice-Marshal Sir W. Sefton Brancker recorded:

> " . . . . the Admiralty realized that we were in serious straits and in April, 1916, they agreed to hand over some Sopwith 1½ Strutters which were

* *The War in the Air, Vol. II, page 452.*

Left: *Dashboard of Sopwith-built 1½ Strutter bomber. The notice visible between the control-column spade grip and the air-speed indicator states: "Fuel capacity 6 hours at ground level, 8 hours at 6,000 feet."* (Photo: John H. Blake). Right: *Two-seat 1½ Strutter of No. 78 (Home Defence) Squadron, R.F.C., at Sutton's Farm, 1917. The aircraft has navigation lights, flare brackets and a streamer on the port rear interplane strut.* (Photo: E. F. Cheesman)





Single-seat conversion of No. 78 Squadron with single over-wing Lewis gun. The air brakes have been removed.
(Photo: E. F. Cheesman)

invaluable to us; because Sopwith was an Admiralty contractor we could not get them ourselves."* That transfers of R.N.A.S. 1½ Strutters were made in April 1916 seems to be confirmed by the notes, given in a later paragraph below, on aircraft that were at Farnborough in that month.

The cumulative effect of handing over the 1½ Strutters to the R.F.C. was to delay the launching of significant operations by No. 3 Wing, R.N.A.S., until October 1916: at the end of August the Wing had only twenty-two serviceable aircraft.

No. 3 Wing began its operations on a small scale on 30th July 1916, when three of its aircraft attacked benzine stores at Mülheim in company with six French bombers of the 4me *Groupe de Bombardement*. The Wing's first major attack was made on 12th October, when thirteen 1½ Strutters and six Breguet Type V bombers of No. 3 Wing took off from Luxeuil, together with twelve Farman F.42s, seven Breguets Type IV and one Breguet V of the 4me *Groupe de Bombardement*. Their target was the Mauser factory at Oberndorf, but some at least of the R.N.A.S. aircraft bombed Donaueschingen in error.

Among the first R.N.A.S. 1½ Strutters to be handed over to the R.F.C. were *9386*, which was at Farnborough on 20th April 1916, *5720* (27th April), *5721* and *7998* (28th April), *7999* and *8000* (30th April), *9403* (14th May) and *9404* (18th May). Of these aircraft, *5720*, *5721* and *7998-8000* are believed to have acquired these serial numbers on being renumbered and may, like *9386*, *9403* and *9404*, have been taken from the first R.N.A.S. batch.

It was at Farnborough that the first 1½ Strutter squadron, No. 70, was formed on 22nd April 1916. It went to France by flights, each going to Fienvillers as its strength of aircraft was made up. Thus "A" Flight went on 24th May, "B" Flight on 29th June, and "C" Flight on 30th July. According to the official history†, the 1½ Strutters of "A" and "B" Flights were fitted with the Vickers-Challenger gun-synchronizing mechanism. Most, if not all, of them had the cumbersome Nieuport rotating mounting on the rear cockpit for the observer's Lewis gun. There can be little doubt that these were ex-R.N.A.S. 1½ Strutters, probably delivered without forward armament and fitted with the Vickers-Challenger gear shortly before going to France.

The aircraft of "C" Flight were taken over from the R.N.A.S., apparently with complete armament. Their Vickers guns were synchronized by the Scarff-Dibovsky gear; the mountings for their rear Lewis guns were the excellent Scarff No. 2 Ring Mounting, another product of the ingenious W/O Scarff.

This immensely practical device was clearly such

* *From* Sefton Brancker, *by Norman Macmillan, page 119.*
† *The War in the Air*, Vol. II, page 163.

Although no armament was fitted to B762 *when this photograph was made at Sutton's Farm this aircraft was fitted with twin Lewis guns on a double Foster mounting and was tested at Martlesham Heath.* (Photo: E. F. Cheesman)

a great improvement upon earlier mountings that General Trenchard was quick to request that it should be fitted to all 1½ Strutters subsequently supplied to the R.F.C.

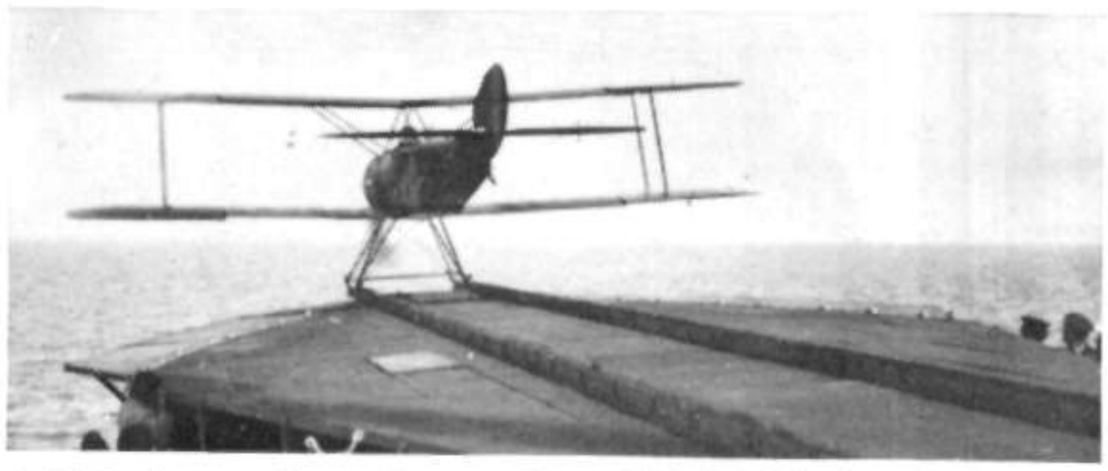
The War Office had placed its own orders for 1½ Strutters for delivery to the R.F.C. The first such contract was given to Ruston Proctor & Co. and was for fifty two-seat aircraft numbered *7762-7811*. Deliveries began in July 1916: on the 20th of that month *7762* was at Farnborough. The early aircraft of this batch had the Nieuport-type gun mounting on the rear cockpit, but the Scarff mounting was standardized for the two-seat version of the 1½ Strutter.

Other War Office contracts went to Vickers Ltd., the Wells Aviation Co., Ltd., Morgan and Co., and Hooper and Co. The first Vickers-built 1½ Strutter, *A1054*, was delivered before the end of July 1916. Wells and Hooper deliveries did not start until April 1917, Morgan in May 1917. The 100 1½ Strutters (*A954-A1053*) built by the Fairey Aviation Co., and the fifty Westland-built aircraft (*A1511-A1560*) may have been originally ordered by the Admiralty. The Westland company supplied twenty-five 1½

9390 *photographed at the Isle of Grain on 8th September 1917, fitted with biplane hydrovane, inflatable air bags mounted on boards that were braced to the upper longerons, and auxiliary bracing at the mid points of the outboard cabane struts.*

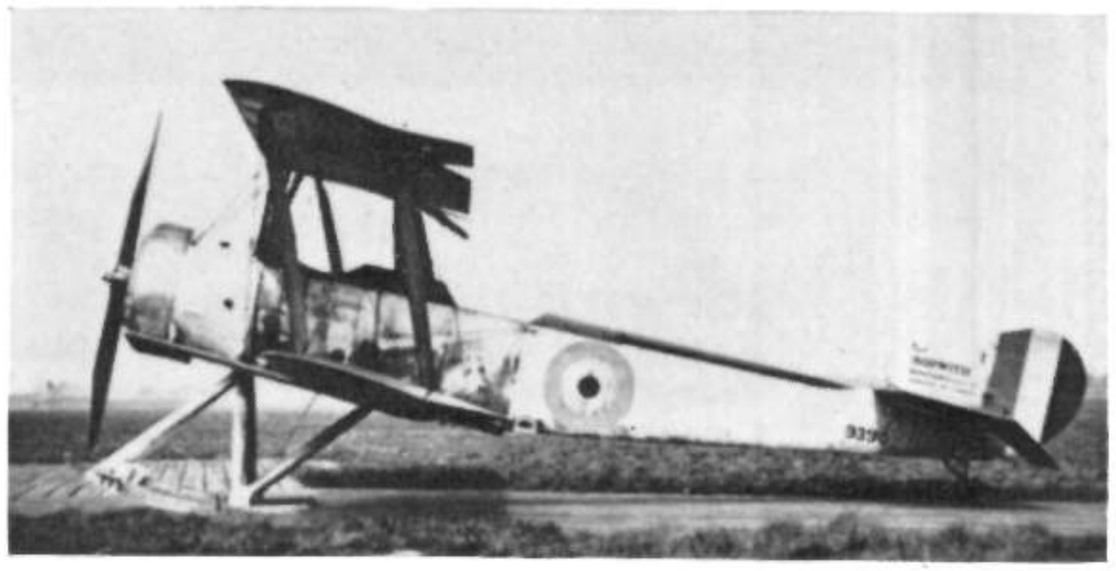
9390 *afloat with air-bags inflated.*

A6911 *at Grain with skid undercarriage, 28th February 1918. The skids are resting in wooden troughs, and the lower part of the engine cowling has been cut away.*



A6911 *about to leave the troughs on H.M.S.* Vindex, *20th March 1918.* (Photo: I.W.M. Q65603)

By 7th April 1918, when this photograph was made at Grain, 9390 *had been fitted with a rigid skid undercarriage that had horns for use in conjunction with fore-and-aft arrester wires.*



Strutters (*N5600-N5624*) to the Admiralty, which had placed further orders with the Sopwith company and with Mann Egerton and Co.

Strikes in the aircraft industry interfered dangerously with the production of 1½ Strutters, and in April 1917 No. 45 Squadron had to accept a flight of war-weary Nieuport two-seaters for want of enough 1½ Strutters to keep the squadron up to strength. Fortunately, enough Sopwiths were delivered to enable the squadron to return the unwanted Nieuports to the depot on 8th May after only three weeks use.

In spite of all the Admiralty's sacrifices the R.F.C. had only four operational 1½ Strutters on 1st July 1916, the day on which the Battles of the Somme began. These were the aircraft of "A" Flight, No. 70 Squadron: despite the departure of "B" Flight from England on 29th June it did not reach Fienvillers until 3rd July.

The Sopwiths of No. 70 Squadron shared Fienvillers aerodrome with Squadrons Nos. 21 and 27. The 1½ Strutter's long range made it the inevitable choice for distant reconnaissance flights and escort duties; in the latter capacity No. 70 Squadron accompanied the Martinsyde Elephants of No. 27 Squadron on several occasions. In the early stages of the Somme struggle No. 70's Sopwiths enjoyed combat successes. On 6th August 1916 a patrol led by Capt. W. D. S. Sanday met a formation of ten German bombers near Bapaume, bent on attacking a target behind the Allied lines. The 1½ Strutters drove the entire enemy formation back to its aerodrome, where all the bombers landed with their bombs still in the racks. A month later to the day, three of No. 70's Sopwiths were attacked west of Busigny. The enemy aircraft were beaten off, one of them being shot down in flames by Capt. Sanday. An offensive patrol of No. 70 Squadron attacked four German aircraft near Bapaume and sent one down out of control. A second was shot down by Capt. G. L. Cruikshank, who later attacked three Rolands single-handed and drove down one of them.

Only two other R.F.C. Squadrons operated the 1½ Strutter on the Western Front. The twelve Sopwiths of No. 45 Squadron left Sedgeford, in Norfolk, on 12th October 1916 and arrived at Fienvillers three days later. According to the official history, the aircraft were at that time fitted with the Scarff-Dibovsky interupter gear and the Scarff ring mounting. In his book *Into the Blue* Wing Cdr. Norman Macmillan states that by the summer of 1917 the Sopwiths of No. 45 Squadron had the Sopwith-Kauper interrupter gear, which had superseded the Ross gear in the unit's aircraft. These frequent changes of equipment must have been trying for the squadron's armourers. Of the Ross gear, Norman Macmillan wrote:

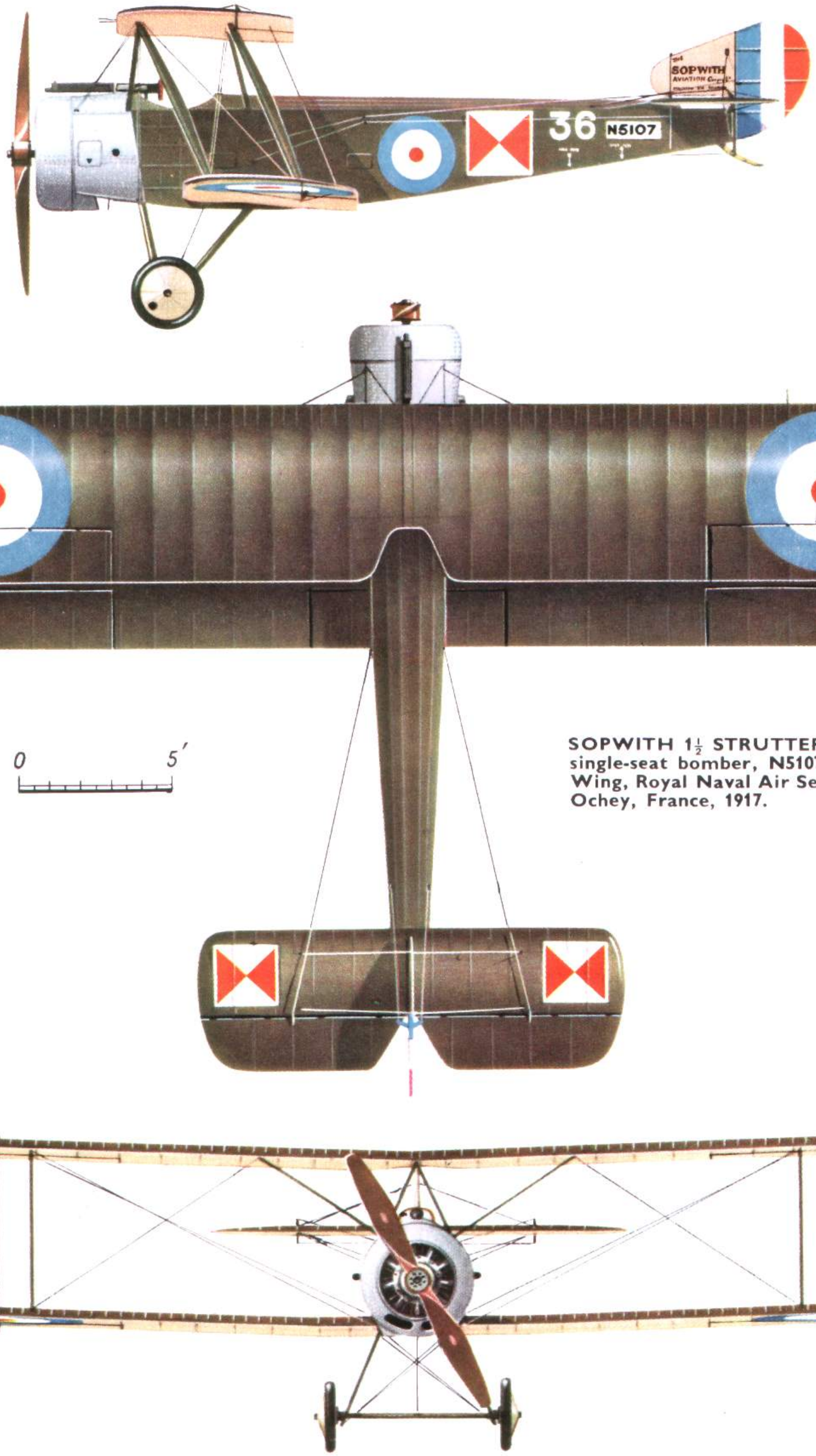
> "The Ross gear suffered from the defect that it slowed up the rate of fire from the Vickers gun very considerably. It had the advantage, however, that it left the normal ground trigger on the gun free for use and when we found ourselves in a really tight corner we fired the gun direct without the gear and got normal rate of fire; although bullets hit the revolving propeller, that was less vital than not getting them off at the target quickly enough. It was quite common for a machine to return with anything up to twenty bullet holes through its propeller. The propeller had then to be scrapped, but I never came across a case of propeller failure in the air due to this cause."

By the time of No. 45 Squadron's arrival at the front *Jagdstaffel* 2, led by Oswald Boelcke, had been operational for a month. Its Albatros D I and D II fighters, armed with twin machine guns, were superior to the 1½ Strutter in performance and manoeuvrability; and as the *Jagdstaffeln* became more numerous, so did the 1½ Strutter become outclassed. On 22nd October three of No. 45 Squadron's Sopwiths failed to return from an offensive patrol. Nevertheless, the squadron destroyed twenty-three enemy aircraft in the eleven months during which it was equipped with 1½ Strutters; this was the highest score of the R.F.C.'s 1½ Strutter squadrons.

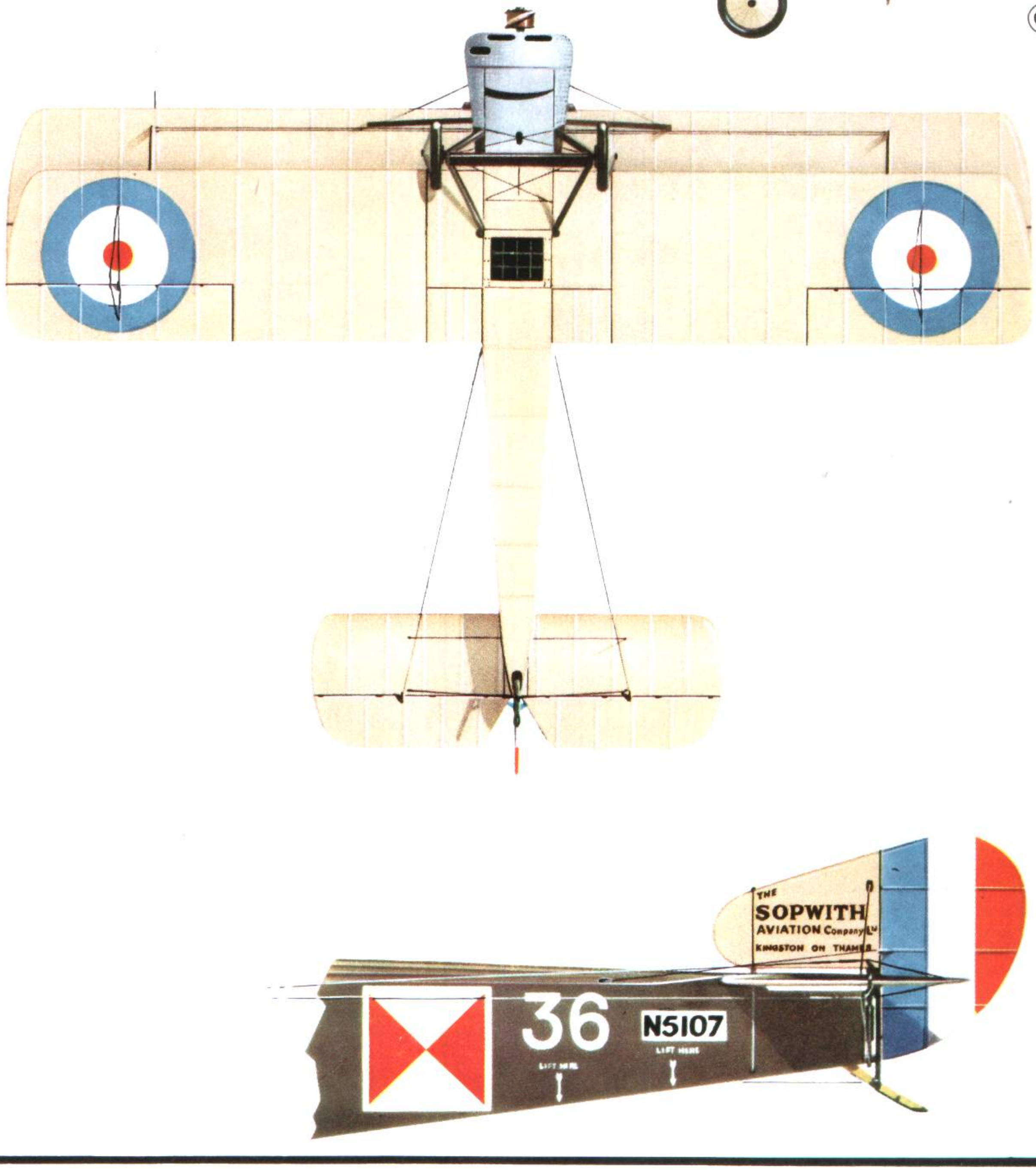
In operational use the 1½ Strutter was modified in various ways. Many aircraft had transparent covering at the inboard ends of the upper wing panels in order to give the pilot some upward view. In No. 5 Wing, R.N.A.S., several of the single-seat bomber 1½ Strutters were fitted with a Lewis gun above the upper wing in supplementation of the single Vickers; it could not be reloaded in flight.

Captain J. Palethorpe of "B" Flight, No. 70 Squadron, R.F.C., augmented the armament of his 1½ Strutter by mounting an automatic pistol at the lower end of the starboard undercarriage V-strut, its ammunition contained in a long magazine. The gun fired outside the arc of the airscrew. The details

(*continued on page 10*)



SOPWITH 1½ STRUTTER
single-seat bomber, N5107, of No. 3 Wing, Royal Naval Air Service, at Ochey, France, 1917.



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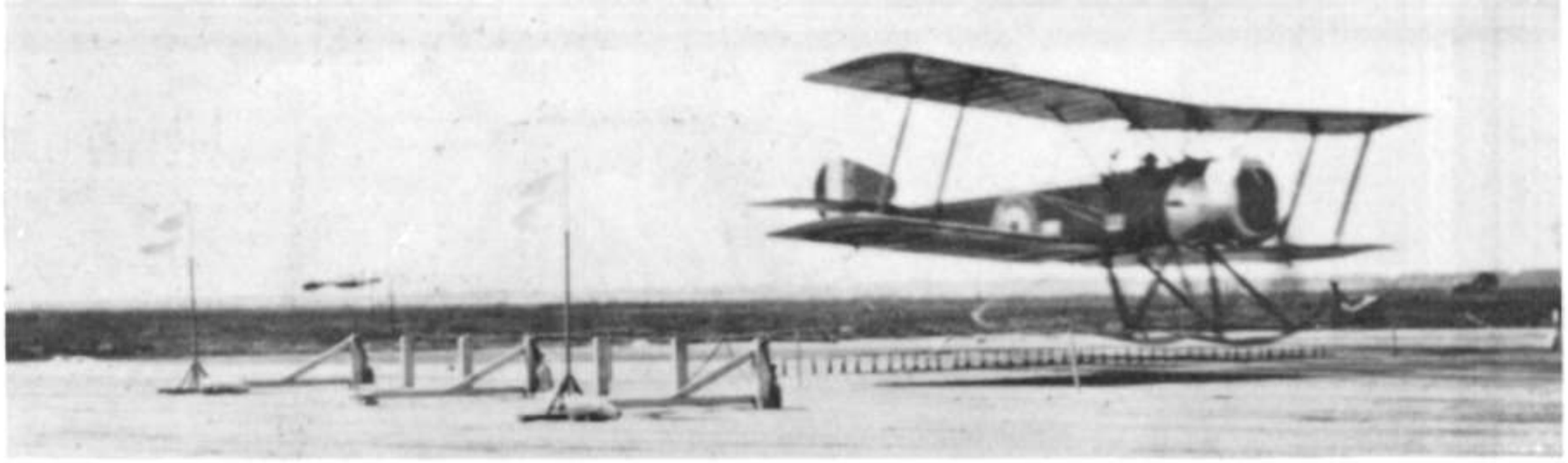
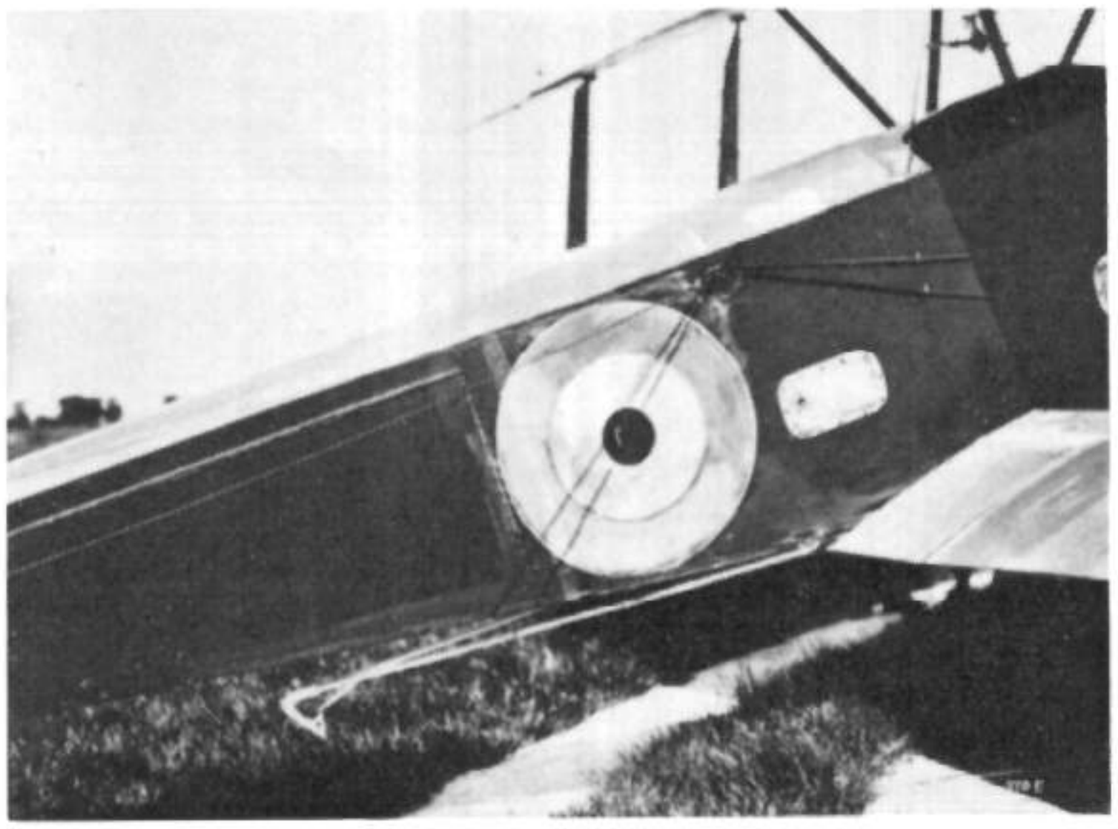


A Sopwith 9700 with skid undercarriage and arrester hook lowered, about to touch down on the dummy deck at the Isle of Grain, 4th June 1918.

The arrester hook on the skid-fitted Sopwith 9700.



of this installation were executed by Sgt. O'Mara of "B" Flight.

The R.F.C. on the Western Front began to receive reinforcements in the shape of R.N.A.S. fighting squadrons in October 1916. At the end of that month No. 8 Squadron, R.N.A.S., arrived at Vert Galand aerodrome; it had one flight of Nieuports, one of 1½ Strutters and one of Pups. The 1½ Strutters had come from No. 5 Wing, R.N.A.S., but Naval Eight exchanged the two-seaters for more Pups on 16th November.

No. 43 Squadron, R.F.C., did not reach France until 17th January 1917. Its Commanding Officer was Major W. Sholto Douglas (now Lord Douglas of Kirtleside) who, in his book *Years of Combat*, wrote:

> "We found that our precious aircraft were much too slow when pitted against the new Albatros and Halberstadt scouts which the Germans had brought into use . . . .
>
> The Sopwith 1½ Strutter was not a particularly easy aircraft to maintain, and there were a number of modifications that we had to make before the new machines could be used, and so the ground crews as well as the air crews were kept working at full pressure . . . .
>
> Our Sopwith 1½ Strutters suffered from the serious disadvantage of all the aircraft which were at that time powered with rotary engines—their performance fell off very rapidly when flying above ten thousand feet . . . the superior performance of the enemy fighters did not give us much opportunity to launch any really effective attacks. After some hair-raising experiences we found that it was necessary for us, if we were to engage the enemy on anything approaching equal terms, to fly underneath his formations so as to lure him into attacking us; and then we would trust to the good shooting of our observers to pick off the Huns as they came diving down to the attack."

Norman Macmillan's views were generally similar. The following extracts from *Into the Blue* give a clear picture of the operational difficulties under which a 1½ Strutter squadron (No. 45) worked in France; and the reference to the aircraft's performance makes an interesting comparison with the performance table on page 16.

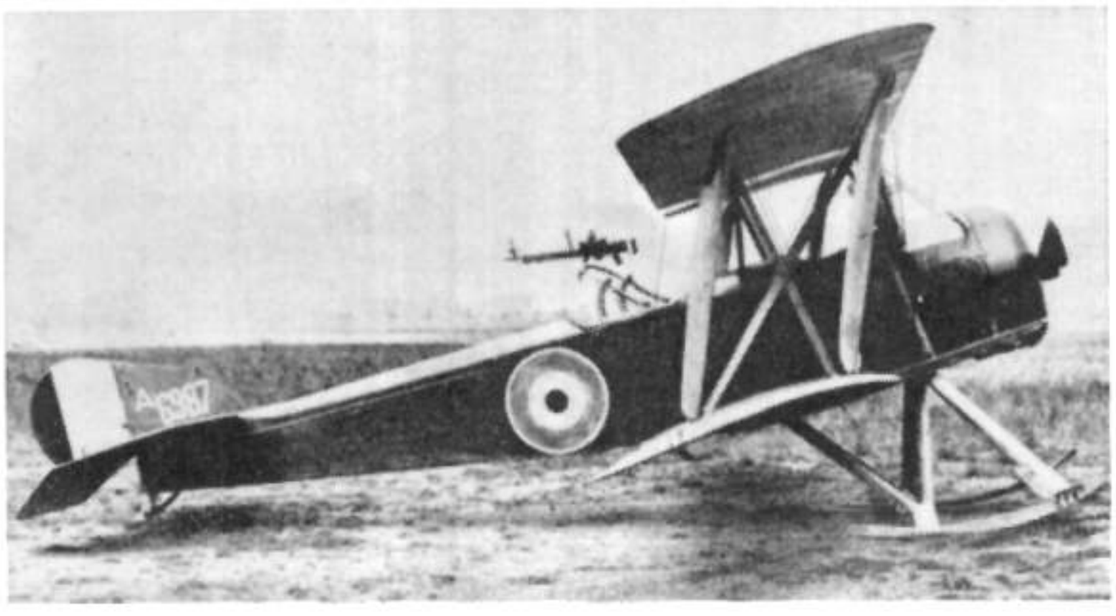
> "The 110 h.p. Clerget air-cooled, rotary engines of our Sopwith two-seaters were heavily worked and required a great deal of attention to keep them going. They developed many minor troubles during flights; broken valve springs, valve rockers, and ignition wires, the latter often causing additional shorting as the engine revolved and the broken wires fouled others; defective oil pumps, defective air pressure to the petrol system, blued cylinders denoting broken obturator rings; magneto defects, and faulty sparking plugs. Our mechanics worked splendidly to keep the buses in service, frequently working all night to change an engine or carry out some other major repair.

The maximum speed we got out of our Sopwiths in full war trim was 95 m.p.h. at 1,325 r.p.m. at low heights. With our low-compression engines, our speed fell rapidly as we climbed and at 10,000 to 12,000 feet (our normal operating height) it dropped to about 80 m.p.h. They were delightful aeroplanes to fly, and beautiful things to look at."

An improvement in the 1½ Strutter's performance followed the replacement of the 110-h.p. Clerget 9Z by the 130-h.p. Clerget 9B. The more powerful engine had been introduced in R.N.A.S. 1½ Strutters as early as August 1916, but Norman Macmillan recorded in *Into the Blue* that No. 45 Squadron did not begin to receive 130-h.p. aircraft until the beginning of May 1917. Indeed, when on 12th May the Ruston Proctor 1½ Strutter *A8258* was inspected at Farnborough prior to acceptance for the R.F.C., it had the 110-h.p. Clerget No. R.925/W.D.3859; and *A8172-A8174*, *A8254* and *A8256* all had the Clerget 9Z when delivered to Farnborough on various dates between 27th March and 11th May 1917. The engine cowling fitted to the more powerful engine was of slightly increased chord and had a greater diameter at its point of maximum camber.

At least one R.F.C. 1½ Strutter, *A8194*, was fitted with a 110-h.p. Le Rhône 9J engine. It was tested at Martlesham in July 1917. The Le Rhône was not a standard engine for British 1½ Strutters, and by July

A6987 with skid undercarriage, board-mounted flotation gear and augmented incidence bracing.



1917 replacement of the Sopwith had begun. Possibly the installation in *A8194* was connected with the use of the 1½ Strutter on Home Defence duties at about that time.

Not until the summer of 1917 were the R.F.C.'s 1½ Strutter squadrons re-equipped, and the gallant old two-seaters fought grimly on through—and sometimes in the thick of—the Battles of Arras and Messines: reconnoitring, photographing, bombing, ground-strafing and, to the end, fighting. The re-equipment of No. 70 Squadron with Camels began on 25th July 1917 and was completed early in September. Squadrons Nos. 43 and 45 had to wait a few weeks longer for their first Camels because twenty-four of the new single-seaters had been diverted to Home Defence duties in consequence of the daylight Gotha raids on London of 13th June and 7th July. No. 45 Squadron had completely replaced its 1½ Strutters by 1st September, No. 43 by 3rd October.

Recording that the three 1½ Strutter squadrons had, in thirty-five operational squadron-months, destroyed a total of 41 enemy aircraft, Norman Macmillan epitomized their achievements thus:

> "And the destruction of these enemy planes by the One-and-a-half Strutter was a record which wrote more gallantry across the skies of France than the far greater totals achieved by some of the later and more favoured British aeroplanes, which turned the odds in the air definitely in favour of the red-white-and-blue circled planes of the British forces."

The R.F.C. used the 1½ Strutter briefly on Home Defence duties in that summer of 1917. Official records indicate that 56 two-seaters and three single-seaters were delivered to Home Defence squadrons, of which Nos. 37, 44 and 78 are known to have used the type. Several of the two-seaters of No. 78 Squadron were converted into single-seaters by transferring the pilot to what was normally the rear cockpit, the forward cockpit being faired over. The Vickers gun was at first retained in its normal position but, being quite six feet away from the pilot, was beyond his reach for clearance of jams. The armament was therefore revised to consist of a Lewis gun on a Foster mounting above the upper wing, but later twin Lewis guns on a double Foster mounting were fitted. To improve the pilot's view cut-outs were made between the spars of the lower stub wings of some aircraft; others had the air brakes removed; and a head fairing was fitted behind the cockpit.

These conversions were conceived by Captain F. W. Honnett of "A" Flight, No. 78 Squadron, in which unit they were known as Sopwith Comics. This nickname was later applied to the night-fighter version of the Camel, possibly because its cockpit also was moved farther aft. (See *Profile* No. 31, the Sopwith F.1 Camel).

The R.N.A.S. had apparently sought an early improvement in the 1½ Strutter's performance, for an installation of the 150-h.p. Smith Static radial engine in the 1½ Strutter was designed in September 1916. This was an American 10-cylinder radial engine of unusual design in which the Admiralty was keenly interested. British production under licence by Heenan and Froude Ltd. was started but few were built. It is not known whether any 1½ Strutter was in fact fitted with a Static, but examples of the engine were flown in the A.D. Navyplane and in two experimental Vickers F.B.5s built for the Admiralty.

A take-off from B turret of H.M.S. Emperor of India. *Note the slotted length of timber serving as a tail guide trestle at the aft end of the platform.*
(Photo: Trustees of the National Maritime Museum)

French Sop. 1B.2. (Photo: Peter M. Bowers)

French-built Sop. 1B.1. (Photo: Musée de l'Air)

The 1½ Strutter saw more widespread use with the R.N.A.S. than with the R.F.C. Apart from its successes with Nos. 1, 3 and 5 Wings of the R.N.A.S. the type was used by R.N.A.S. units operating in the Aegean area. Both versions of the 1½ Strutter were used by the mixed units that flew from the Greek islands: "A" Squadron on Thasos, "B" Squadron from Thermi on Mitylene, "C" Squadron from Gliki on Imbros and from Mudros on Lemnos, and "D" Squadron from Stavros on the mainland. When "E" Squadron was formed in March 1917 to be the R.N.A.S. component of the Composite Fighting Squadron created to combat *Kampfgeschwader 1* its equipment included four 1½ Strutters. "F" Squadron, R.N.A.S., was formed at about this time for bombing duties, and its 1½ Strutters made many attacks on enemy dumps and camps behind the Dojran front.

This last unit passed through several vicissitudes before it reached Thermi at the end of July, at which time it had five 1½ Strutter bombers, three 1½ Strutter fighters and one Camel.

Germany's initiation of unrestricted submarine warfare on 1st February 1917 led to appalling losses of Allied shipping. To augment existing seaplane patrols new aerodromes, each with four 1½ Strutters, were opened at Pembroke, Mullion and Prawle Point. The Sopwiths made oversea patrols in the anti-submarine rôle, but their activities were prematurely terminated in August 1917 owing to the need to maintain the strength of R.N.A.S. units attached to the R.F.C. in France.

One-and-a-half Strutters were used for anti-submarine duties from June 1917 onwards in the Mediterranean. These were aircraft of No. 6 Wing, R.N.A.S., based at Otranto; because their rotary engines enabled them to take off quickly they were used mainly as stand-by aircraft that were sent up immediately the sighting of a U-boat was reported.

The R.N.A.S. took 1½ Strutters to sea, and the type was extensively used in experiments in deck flying and with flotation gear. Under the policy enunciated in January 1918 by the Operations Committee of the Board of Admiralty reconnaissance aircraft were to operate mainly from carrier vessels, fighting aircraft from fighting ships. When H.M.S. *Furious* rejoined the Grand Fleet in March 1918 after alterations she had a landing-on deck 284 ft. long and 70 ft. wide, and her complement of aircraft included fourteen 1½ Strutters. Some 1½ Strutters were also carried by the carriers *Vindex* and *Argus*.

As if in anticipation of shipboard use, but possibly as a consequence of the anti-submarine use of the type, a 1½ Strutter, *9390*, was fitted with air bags and a biplane hydrovane at the Isle of Grain and was successfully ditched in September 1917. This particular 1½ Strutter had additional stays to the mid-points of its outer cabane struts, and underwent many modifications and later immersions at the Isle of Grain.

Several 1½ Strutters were flown at Grain with skid undercarriages similar to that of the Sopwith 9901a version of the Pup. Thus modified, *A6911* was flown from wooden troughs laid across the dummy deck at Grain in February 1918. Identical troughs were fitted to the seaplane carrier H.M.S. *Vindex*, and *A6911* was put aboard her on 20th March 1918. Flown by Lt. W. G. Moore, D.S.C., the aircraft made a successful take-off from the troughs on that date.*

By this time *9390* had been fitted with a skid undercarriage and was subjected to flotation tests in this form on 7th April, having successfully ditched on an earlier occasion on 22nd March. Similarly equipped with board-mounted air bags and skid undercarriage were *A5952* and *A6987*, which differed from *9390* only in having the hydrovane in line with the lower ends of the front skid struts instead of immediately behind them. *A5952* apparently had rubber bungee return springs on its upper ailerons in place of the standard balance cable; *A6987* had what appeared to be auxiliary incidence bracing consisting of X-struts fitted between the wings at the ends of the outer cabane struts.

Early in June 1918 a single-seat bomber 1½ Strutter fitted with a skid undercarriage was used in early tests of arrester gear at Grain. At that time athwartships arrester cables were used, and an arrester hook was pivoted under the lower longerons at a point in line with the trailing edge of the lower wings.

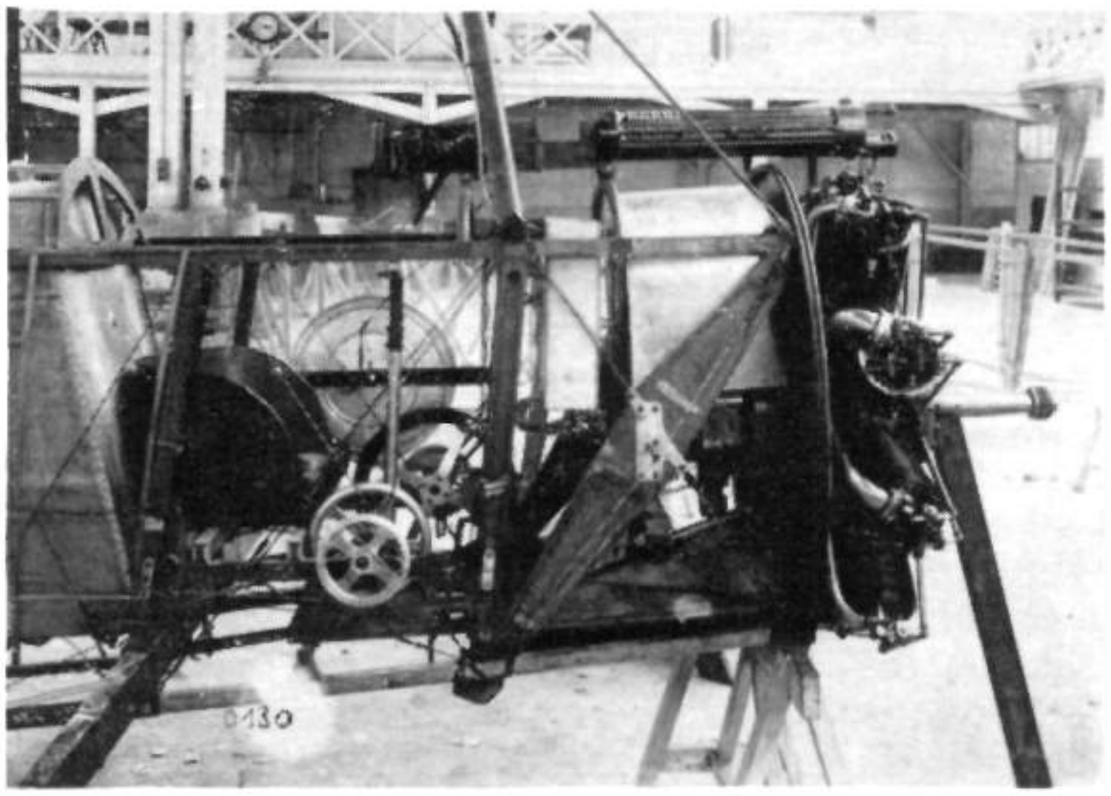
When H.M.S. *Argus* commenced flying activities in the autumn of 1918 she had the much clumsier fore-and-aft arrangement of arrester cables. At least one 1½ Strutter, *F2211*, was fitted with nine hook-on clips on the underside of its undercarriage spreader bar and an airscrew guard, and was flown from and landed on *Argus*. This aircraft, piloted by Lt. Col. R. Bell-Davies, V.C., D.S.O., made the first flight from the new carrier on 1st October.

F2211 was one of a number of 1½ Strutters (*F2210-F2229* and *F7547-F7584*) assembled, possibly from spares, in 1918 for operation from ships. So much success had been achieved in flying Pups and Camels from sketchy little platforms mounted on warships' gun turrets that it was decided to experiment in the same way with two-seat reconnaissance aircraft. The 1½ Strutter was chosen for the experiments.

After an unsuccessful attempt to fly-off a 1½ Strutter from the extended turret platform of H.M.S. *Repulse*, a larger platform was fitted to H.M.A.S. *Australia*. From that ship on 4th April 1918 Captain F. M. Fox made the first successful take-off in a 1½ Strutter that carried an observer and full wireless equipment. Thereafter extended platforms for two-seat aircraft were fitted to the forward turrets of all British battle cruisers; the single-seaters were to be carried on standard platforms on the ships' after turrets. By October 1918 no fewer than thirty-six 1½ Strutters were with the Grand Fleet.

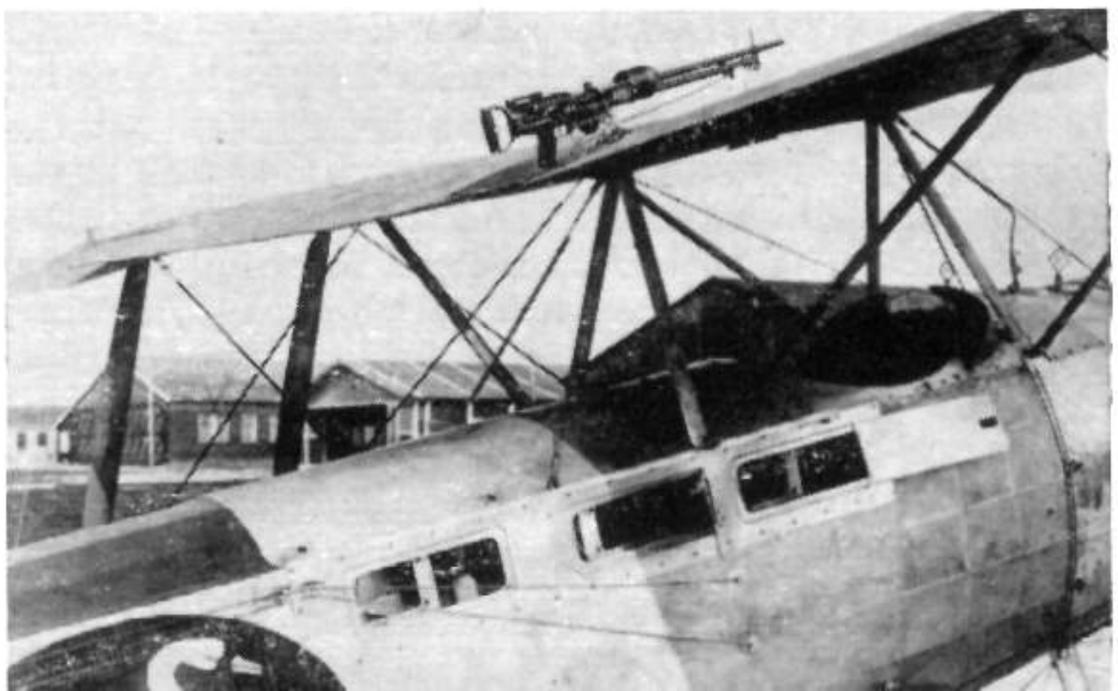
France was interested in the 1½ Strutter from an early date, and the French authorities wanted very large numbers of both versions of the type for the equipment of reconnaissance and bombing *escadrilles*. Nine of the first 150 aircraft built for the Admiralty were transferred to the French government; the first of these (*9413*) was a two-seater, the others (*9651*, *9655*, *9657*, *9661*, *9664*, *9666*, *9720* and *9742*) were all single-seat bombers. At least 53 further aircraft from R.N.A.S. contracts were transferred to France, most of them when No. 3 Wing was disbanded in the spring of 1917.

Two of the earliest 1½ Strutter bombers transferred



Cockpit details of a French-built 1½ Strutter.
(Photo: Musée de l'Air)

The French single-seat 1½ Strutter had three access panels for the bomb bay just under the upper longeron on the starboard side, suggesting vertical bomb stowage. This photograph depicts the Hanriot-built No. 115 which, in Dutch service, became LA-45. (Photo: G. H. Kamphuis)



* *Contrary to the assertion in Lt. Moore's book* Early Bird *this flight did not terminate in a ditching with deployed flotation gear.* A6911, *a Hooper-built 1½ Strutter, was not fitted with the air bags worn by the ditched 1½ Strutter illustrated opposite p.115 of* Early Bird: *that aircraft was Westland-built.*

to the French made a remarkable attack on Essen on 24th September 1916. Piloted by Capitaine L. de Beauchamp and Lt. Daucourt, the aircraft took off from Luxeuil at 11 a.m., dropped twelve bombs on Essen, and landed back at Luxeuil at 5 p.m. after a flight of 800 kilometres. De Beauchamp, again flying a single-seat 1½ Strutter, made an even more spectacular flight on 17th November. He took off from Luxeuil at 8 a.m., dropped six bombs on Munich at noon, flew across the Alps and landed at Santa Dona di Piave in Italy at 4 p.m.

French production of the 1½ Strutter began in 1916. Some of the first French-built aircraft were delivered to the 4me *Groupe de Bombardement* at Luxeuil-les-Bains early in September, and by 1st October the *Groupe* had fifteen on its strength. The plans for the attack on the Mauser works at Oberndorf (see page 6) envisaged the use of twelve of the French 1½ Strutters to escort the Farmans of *Escadrille* F.123.

The French were well satisfied with the performance of the 1½ Strutters in the Oberndorf raid, and they intended to convert the *Escadrilles* F.29, F.123 and B.M.120 into Sopwith units for the purpose of making further long-distance raids in collaboration with No. 3 Wing, R.N.A.S.

In French service the two-seat 1½ Strutter was designated Sop. 1A.2 in its fighter-reconnaissance form, Sop. 1B.2 as a bomber; the single-seat bomber was the Sop. 1B.1. Later versions of the Clerget and Le Rhône engines were fitted to the French-built aircraft: the 135-h.p. Clerget 9Bb, 145-h.p. Clerget 9Bc and 135-h.p. Le Rhône 9Jby were installed.

French production of the 1½ Strutter was on a very large scale, some 4,500 being ordered from French constructors. Unfortunately, it seems to have been slow to gather momentum. Enough had been delivered to allow *Escadrilles* F.29 and F.123 to exchange their Farmans for 1½ Strutters in December 1916, but it was June 1917 before the new bombing units SOP 129, SOP 131 and SOP 132 could be formed. In the following month PS 128 relinquished its Paul Schmitt bombers on being re-equipped with 1½ Strutters. The Voisin *Escadrilles* VB 108 and VB 107 became SOP 108 and SOP 107 in, respectively, September and November 1917; and the last French 1½ Strutter bombing unit, SOP 134, was formed as late as January 1918. In that month re-equipment of the 1½ Strutter *escadrilles* began, SOP 29 and SOP 128 receiving Breguet 14B.2 aircraft in place of their Sopwiths. SOP 123 followed suit in February 1918, SOP 129, 131 and 132 in March; and finally in April SOP 134 became BR 134.

Indeed, it seems that French production of the 1½ Strutter continued until about April 1918, for there are indications that the last of the 753 that were built by the Darracq company was delivered in that month.

By that time the 1½ Strutter was hopelessly outclassed on the Western Front; in truth it had been so when the majority of the French 1½ Strutter units received their aircraft, consequently French experience with it was generally unhappy.

After its withdrawal from operational use with French units the 1½ Strutter saw widespread use as a trainer at French military flying schools. It has been reported that some of these trainer variants were fitted with the 80-h.p. Le Rhône engine and had full dual control. Several French 1½ Strutters acquired civil registrations after the Armistice.

The Sopwith was flown by three *escadrilles* of

Elaborate modifications to F-CMAO provided an enclosed cabin for two passengers. Gravity fuel tanks were fitted under the upper wings to replace the normal fuselage tanks, the cabane bracing was augmented, and the fuselage sides were faired.
(Photo: Musée de l'Air)

Belgium's *Aviation Militaire*, the 2me, 3me and 4me. Eight British-built two-seaters, *N5235-N5242*, were transferred to Belgium, and it is probable that the other Belgian 1½ Strutters were of French construction. First-class Sergeant Willy Coppens (now Baron Coppens de Houthulst) of the 4me *Escadrille* flew *N5240* for a time; and on 6th July 1917 King Albert of the Belgians flew over the lines in a 1½ Strutter piloted by Jacques de Meeûs.

Several Belgian 1½ Strutters survived the war. The last in service with the *Aéronautique Militaire* was declared obsolete in October 1921; and one, given the civil registration O-BAJN and converted into a three-seater, was used as a joy-riding aircraft.

Some 1½ Strutters saw service in Russia, whence *N5219* and *N5244* had been sent in 1916; later aircraft were apparently French-built, but at least one other ex-R.N.A.S. 1½ Strutter was flown in Russia. During winter operations against the Bolsheviks it was fitted with a ski undercarriage. *A6950* also went to Russia and had a relatively long life: it was delivered to the 36th *Aviaotryad* at Bolcheyarskaya in January 1920. The type was used for reconnaissance duties in 1917, and some were flown by the White Russians in the fighting that followed the revolution.

Between February and May 1918 the American Expeditionary Force brought from the French government a total of 514 1½ Strutters. Most of these aircraft were used for training purposes, notably at Issoudun, but for want of more up-to-date aircraft, the 88th, 90th and 99th Aero Squadrons had to fly 1½ Strutters operationally for a time in 1918. The 88th received its 1½ Strutters as late as 5th May 1918 and did not start to re-equip with Salmson 2A.2s until 18th July. Some of these American 1½ Strutters were taken back to the U.S.A. after the Armistice.

The U.S. Navy took over twenty-one of these Sopwiths, the aircraft being given the U.S.N. designating numbers *A5725-A5728* and *A5734-A5750*. An earlier acquisition, apparently direct from abroad, was numbered *A5660*. One of these 1½ Strutters was aboard U.S.S. *Texas* in March 1919 for the U.S. Navy's annual manoeuvres in the Caribbean. The *Texas* had been fitted with a turret platform in November while in England.

For the following year's manoeuvres the U.S. Fleet took with it one Camel, several Nieuport 28s and a number of 1½ Strutters. The aircraft were assembled at Guantanamo, Cuba, and to each of the battleships *Arizona*, *Nevada*, *Oklahoma* and *Pennsylvania* were allocated one Nieuport 28 and one 1½ Strutter. All the aircraft had hydrovanes, flotation

A two-seat 1½ Strutter on skis in Russia. It has a 110-h.p. Le Rhône engine and bomb racks under the lower wings. The serial number is partly obscured but appears to be either A5256 *or* A5956. (Photo: Peter M. Bowers)

gear and jettisonable wheels (presumably of Grain design); the launching technique included the use of the Tail Guide Trestle developed by the R.N.A.S.

A few 1½ Strutters were used by a U.S. Navy Ship Plane Unit set up for training purposes at March Field, California, late in 1919. It seems that the U.S.N. 1½ Strutters were scrapped in the summer of 1920, but one or two survivors of the American purchase of 1918 were bought by private owners and went on to the American civil register. One of these, said to be powered by a 90-h.p. Curtis OX-5 engine, was registered to a Mr. J. H. Ecker of Flint, Michigan, as late as 1st July 1930.

During the war Holland's *Luchtvaart Afdeling* acquired five 1½ Strutters by purchasing interned aircraft that had made forced landings in Dutch territory. Four were British, including the first production aircraft, *9376*, which was interned on 22nd April 1917; it was given the Dutch serial number *LA-42* and was renumbered *S-412* in 1918. Earlier Dutch acquisitions were *9396*, forced to land in Holland on 25th August 1916 after bombing the Zeppelin sheds at Cognelée and numbered *LA-33*; *9420*, forced down on 17th September 1916, became *LA-38* and, in 1918, *S-24*; and *N5154*, landed on 12th May 1917, which became first *LA-34*, subsequently *S-413*. The fifth Dutch 1½ Strutter was an Hanriot-built French single-seat bomber, No. 115 of *Escadrille* SOP 111, which became *LA-45* and was later *S-701*.

Small numbers of 1½ Strutters went to Roumania, Japan, Latvia, and possibly Brazil. Some of the Japanese aircraft were of French manufacture; a few saw service in Siberia in 1918 with the Japanese Army Expeditionary Force during the Japanese intervention.

In the R.A.F. the type disappeared quickly and only one was given a British civil registration. This was G-EAVB, registered to C. H. Oliver on 7th August 1920; it was a three-seater in its civilian guise.

The Musée Royal de l'Armée et d'Histoire Militaire in Brussels today houses the only known surviving 1½ Strutter, still bearing its Belgian number *S.88*.

Although it may have been damned with faint praise, the Sopwith 1½ Strutter was of historic importance in the evolution of the military aeroplane, for it was the first tractor two-seat fighter that gave both pilot and observer practical armament. Although its widest use was as a reconnaissance or bomber aircraft its strongest claim to be remembered rests on the fact that it established the formula so brilliantly confirmed by the Bristol Fighter.

PRODUCTION

It is difficult to determine the precise number of 1½ Strutters that were built. British production apparently totalled 1,439 aircraft (plus possibly the 58 aircraft assembled for shipboard use in 1918); about 4,500 were built by French manufacturers.

British contractors

Sopwith Aviation Co. Ltd., Canbury Park Road, Kingston-on-Thames: 3686, 9376-9425, 9651-9750, 9892-9897, N5080-N5179, N5500-N5537 (N5538-N5549 cancelled).
Fairey Aviation Co., Ltd., Hayes, Middlesex: A954-A1053.
Hooper & Co. Ltd., 77 Kings Road, Chelsea: A6901-A7000.
Mann, Egerton & Co., Ltd., Prince of Wales Road, Norwich: N5200-N5249, N5630-N5654.
Morgan & Co., Leighton Buzzard: A5950-A6149.
Ruston, Proctor & Co., Ltd., Lincoln: 7762-7811, A2381-A2430, A8141-A8340, B2551-B2600.
Vickers Ltd. (Aviation Dept.) Imperial Court, Basil Street, Knightsbridge, London, S.W. (production at Crayford works): *A1054-A1153, A8744-A8793.*
Wells Aviation Co., Ltd., 30 Whitehead's Grove, Chelsea, London, S.W.3: A5238-A5337.
Westland Aircraft Works, Yeovil: A1511-A1560, N5600-N5624.

The serial numbers *N5940-N5954* were allotted for 1½ Strutters but the order was cancelled.

Rebuilds

No. 1 (Southern) Aeroplane Repair Depot, South Farnborough, Hants: B744, B762, B7903, B7914-B7916.
No. 2 (Northern) A.R.D., Coal Aston, Sheffield: B4044.
No. 3 (Western) A.R.D., Yate, Bristol: B8911, B8912.

Ship-board 1½ Strutters

F2210-F2229, F7547-F7584.

R.N.A.S. aircraft renumbered on transfer to R.F.C.

5719-5721, 7942, 7998-8000, A377-A386, A878-A897, A1902-A1931, A2431-A2432, A2983-A2991.

French contractors

A. Darracq et Cie, 33 quai de Seine, Suresnes, Seine et Oise, France: built 753 aircraft.
Societe anonyme des Appareils d'Aviation Hanriot, avenue des Moulineaux, Billancourt, Seine.
Liore et Olivier, 46-48 boulevard de la Revolte, 1 rue Chantal, Levallois-Perret.
Sarazin Freres, 81 rue Arago, Puteaux.

SERVICE USE

British

Western Front: R.F.C. Squadrons Nos. 43, 45 and 70; Nos. 1, 3 and 5 Wings, R.N.A.S.; No. 8 Squadron, R.N.A.S.
Aegean area: A, B, C and D Squadrons, R.N.A.S.
Macedonia: E and F Squadrons, R.N.A.S.; Composite Fighting Squadron (R.F.C. and R.N.A.S.) at Hadzi Junas.
Italy: No. 6 Wing, R.N.A.S.; No. 225 Squadron, R.A.F.
Russia: R.A.F. contingent of B.E.F., North Russia; No. 1 (Slavo-British) Squadron.
Home Defence: R.F.C. Squadrons Nos. 37, 44 and 78.
Coastal Patrol: R.N.A.S. stations at Great Yarmouth, Mullion, Padstow, Pembroke and Prawle Point.
Shipboard use: Aircraft carriers *Furious, Vindex* and *Argus:* battleships *Barham, Emperor of India, Queen Elizabeth, Warspite:* battle cruisers *Australia, New Zealand.*

French

Western Front: Escadrilles SOP 13, 23, 24, 28, 29, 36, 54, 61, 66, 71, 106, 107, 108, 111, 123, 128, 129, 131, 132, 134, 141, 204, 206, 210, 214, 221, 222, 223, 224, 226, 227 and 270.
Italy: Long-range artillery observation unit, *l'Escadrille de l'Espinasse*, 23rd May to 15th July 1917; *Escadrilles* SOP 36, 206, 214 and 221 for about five months from the end of 1917.
Macedonia: Unit based at Florina.

Belgian

Western Front: 2me, 3me and 4me Escadrilles.

United States

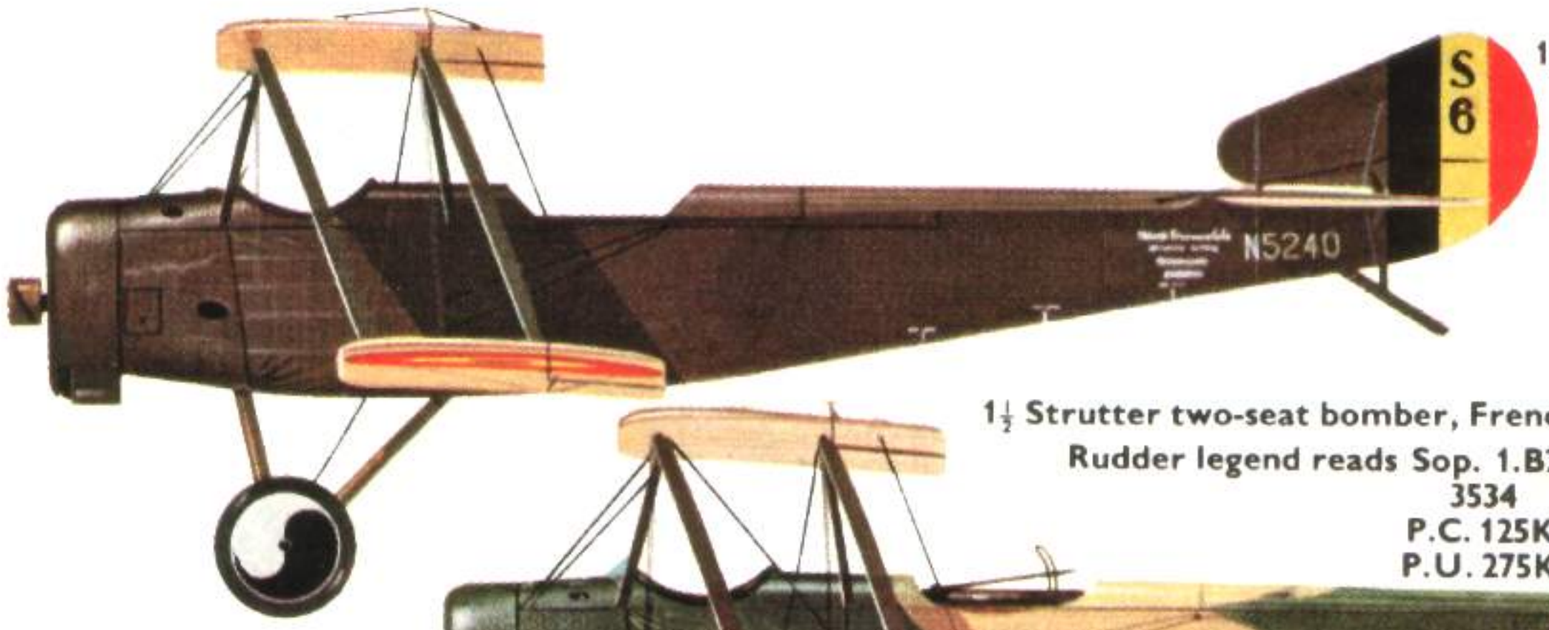
Western Front: 88th, 90th and 99th Aero Squadrons, U.S. Air Service. *U.S. Navy:* Battleships U.S.S. *Arizona, Nevada, Oklahoma, Pennsylvania* and *Texas:* U.S. Naval base, Guantanamo, Cuba; Ship Plane Unit, March Field, California.

Russia

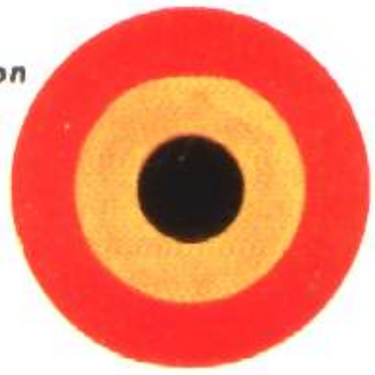
At least one 1½ Strutter with 36th Aviaotryad, Bolcheyarskaya, 1920.

EXAMPLES OF 1½ STRUTTERS USED BY OPERATIONAL UNITS

No. 43 Sqn., R.F.C.: A960, A970, A1010, A1108, A2388, A2406.
No. 45 Sqn., R.F.C.: 7775, A1072, A8173, A8268, A8295, B2583.
No. 70 Sqn., R.F.C.: 7942, A383, A957, A1902, A2984, A8172.
No. 78 Sqn., R.F.C.: A6906, B762.
No. 1 Wing, R.N.A.S.: 9419, 9422, 9425.

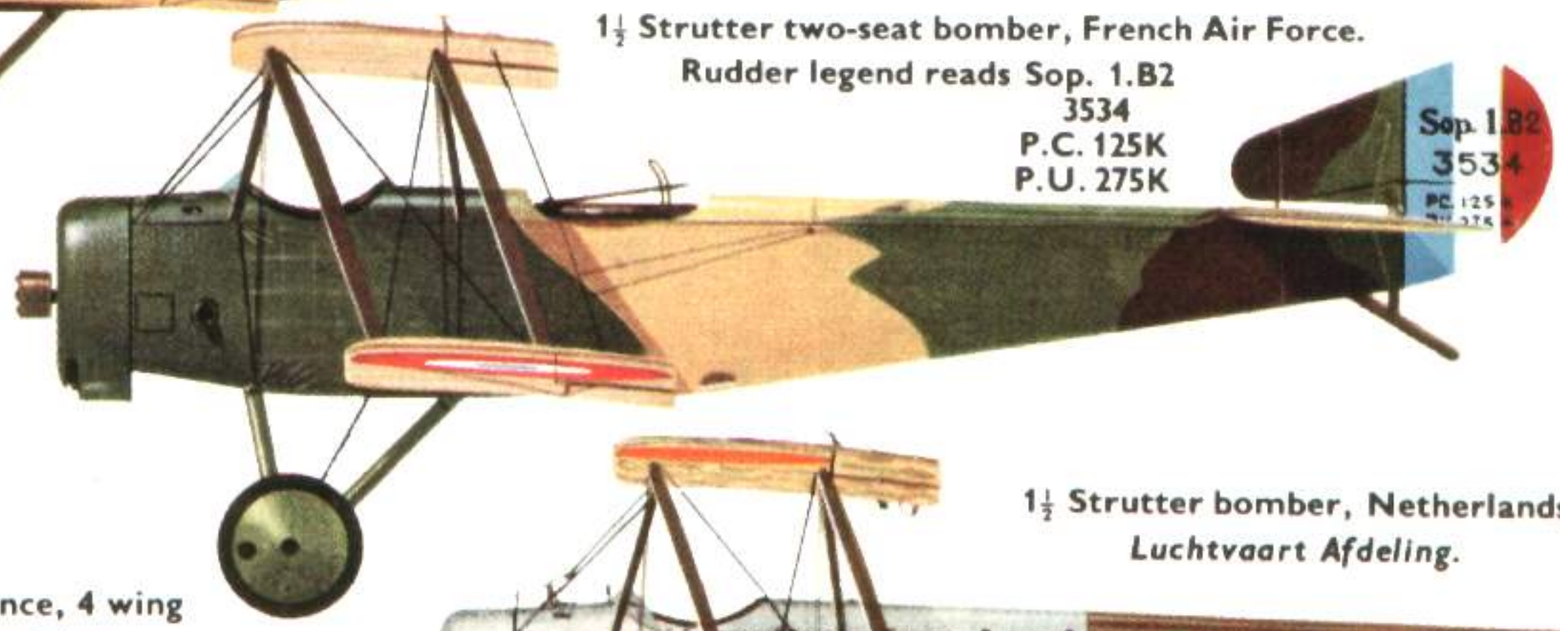


1½ Strutter, Belgian *Aviation Militaire*. S6, ex-R.N.A.S. N5240, flown by Willy Coppens, 1917. Fuselage legend reads: MANN EGERTON & CO. LTD. AIRCRAFT WORKS NORWICH ENGLAND



Belgium, 4 wing positions.

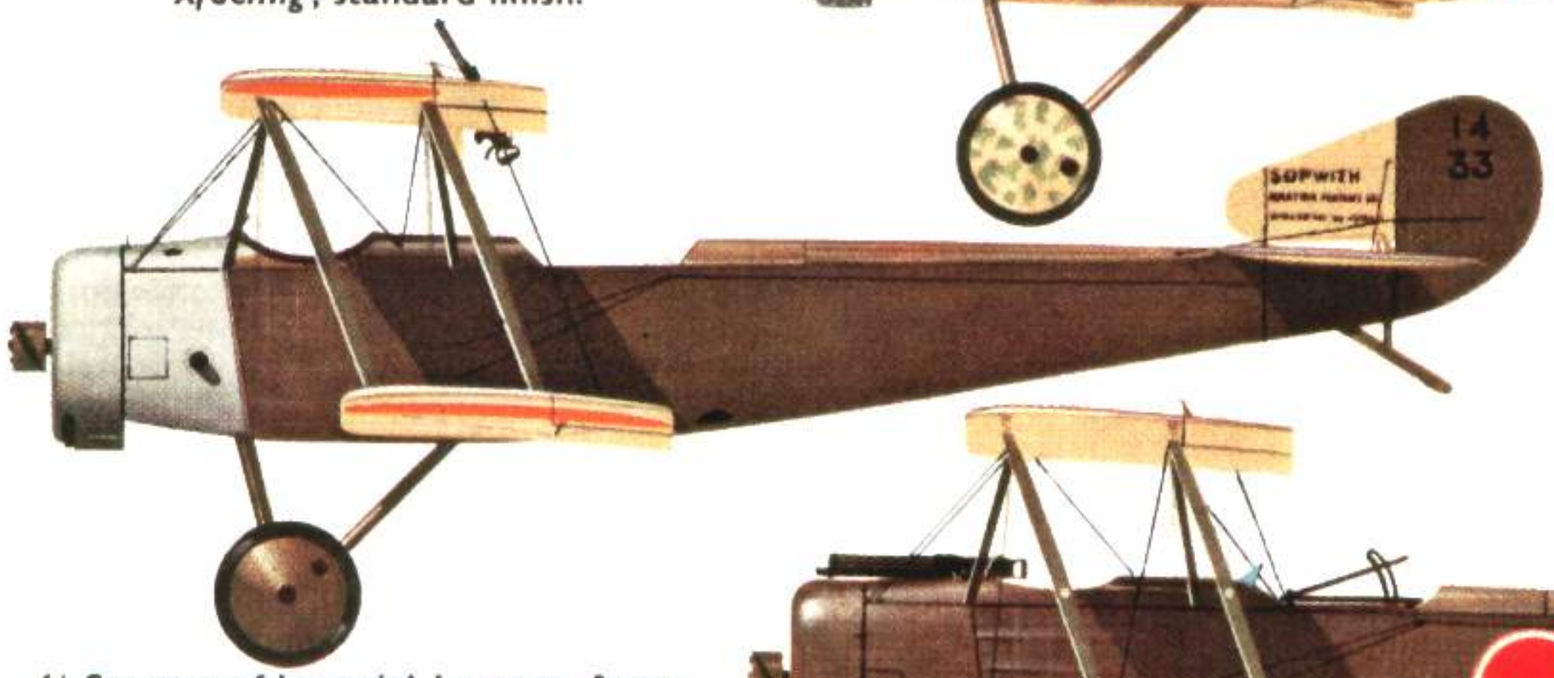
1½ Strutter two-seat bomber, French Air Force. Rudder legend reads Sop. 1.B2 3534 P.C. 125K P.U. 275K



France, 4 wing positions.

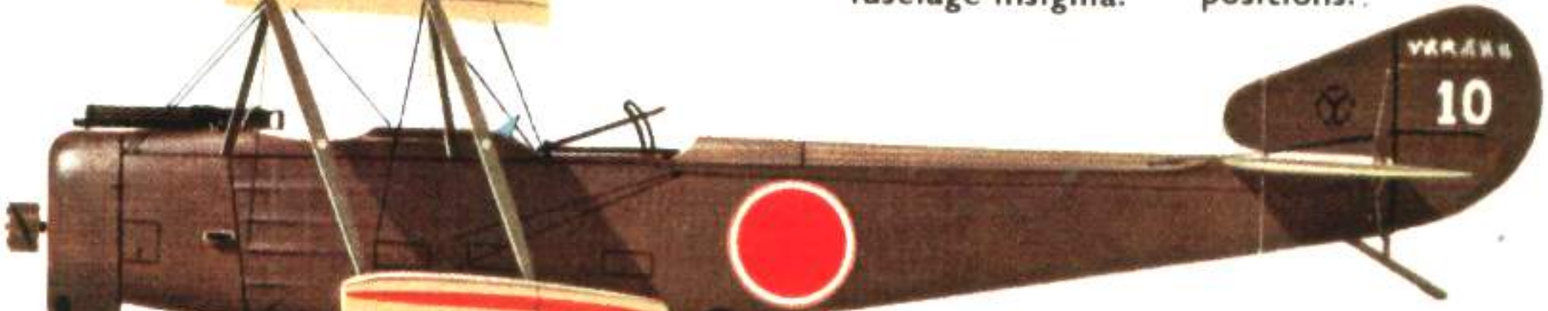
1½ Strutter bomber, Netherlands *Luchtvaart Afdeling*.

1½ Strutter, Netherlands *Luchtvaart Afdeling*; standard finish.

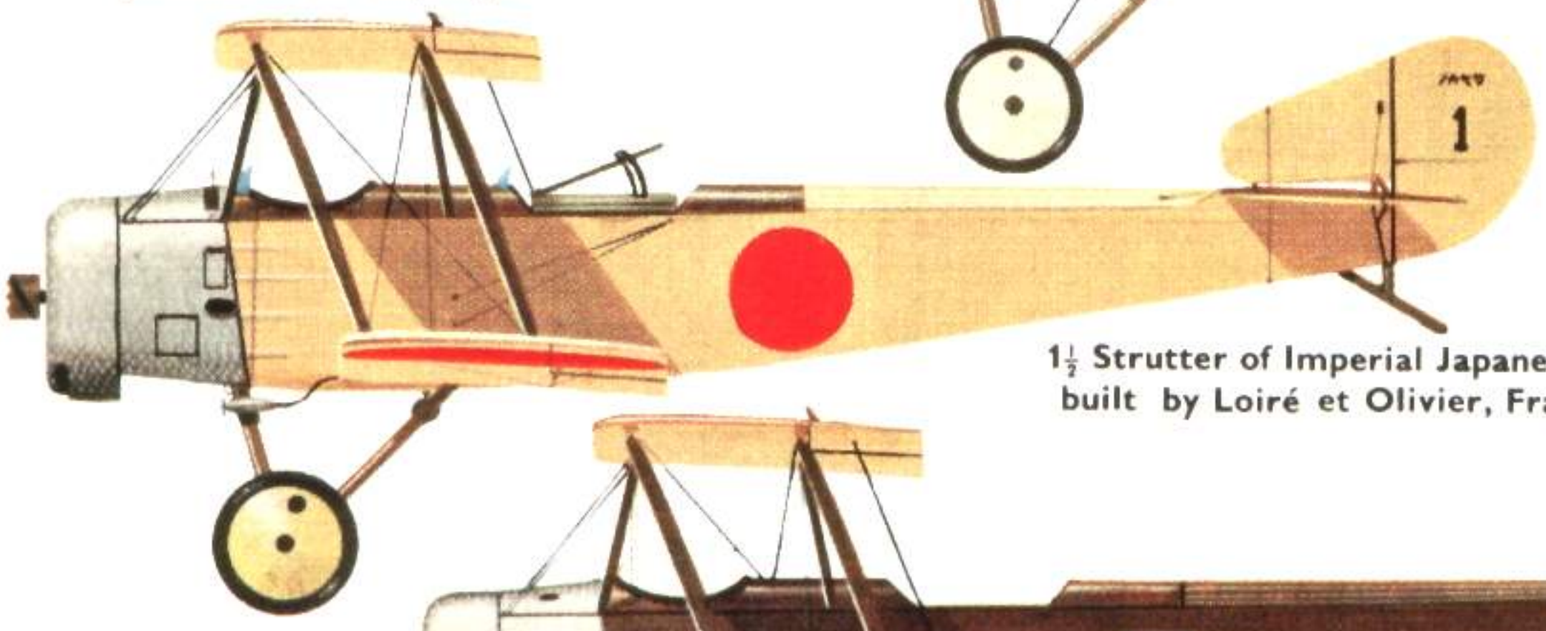


Non-standard fuselage insignia.

Netherlands, 6 wing positions.



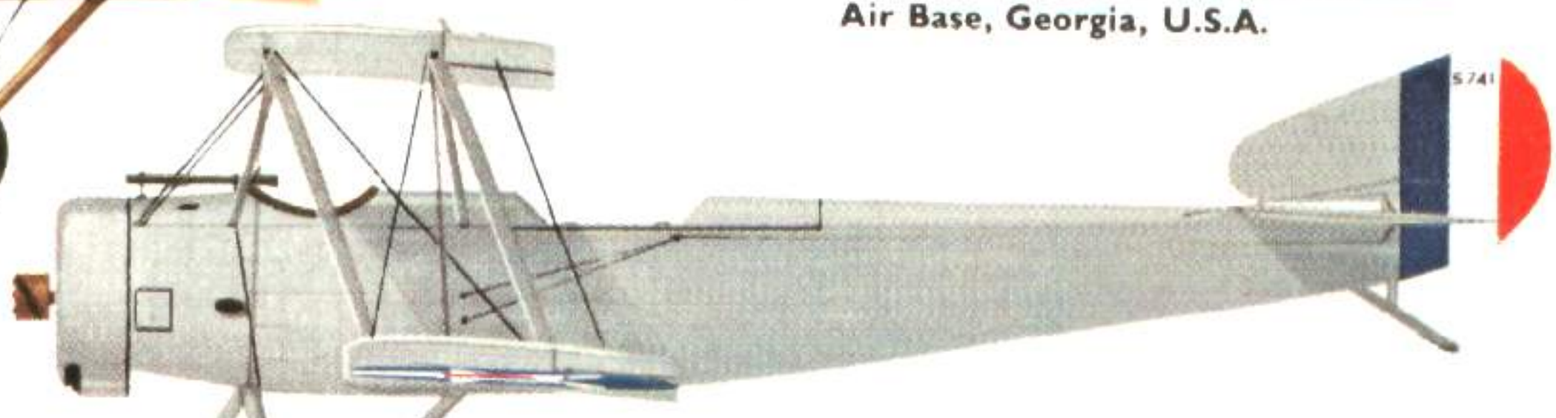
1½ Strutter of Imperial Japanese Army Air Force, Army Expeditionary Force, Siberia, 1918. U.K.-built machine, purchased for 500,000 yen.



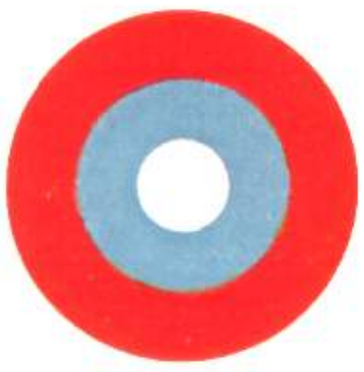
1½ Strutter of Imperial Japanese Army Air Force; built by Loiré et Olivier, France.

Japan, 4 wing positions.

1½ Strutter, U.S. Army Air Corps, Americus Air Base, Georgia, U.S.A.



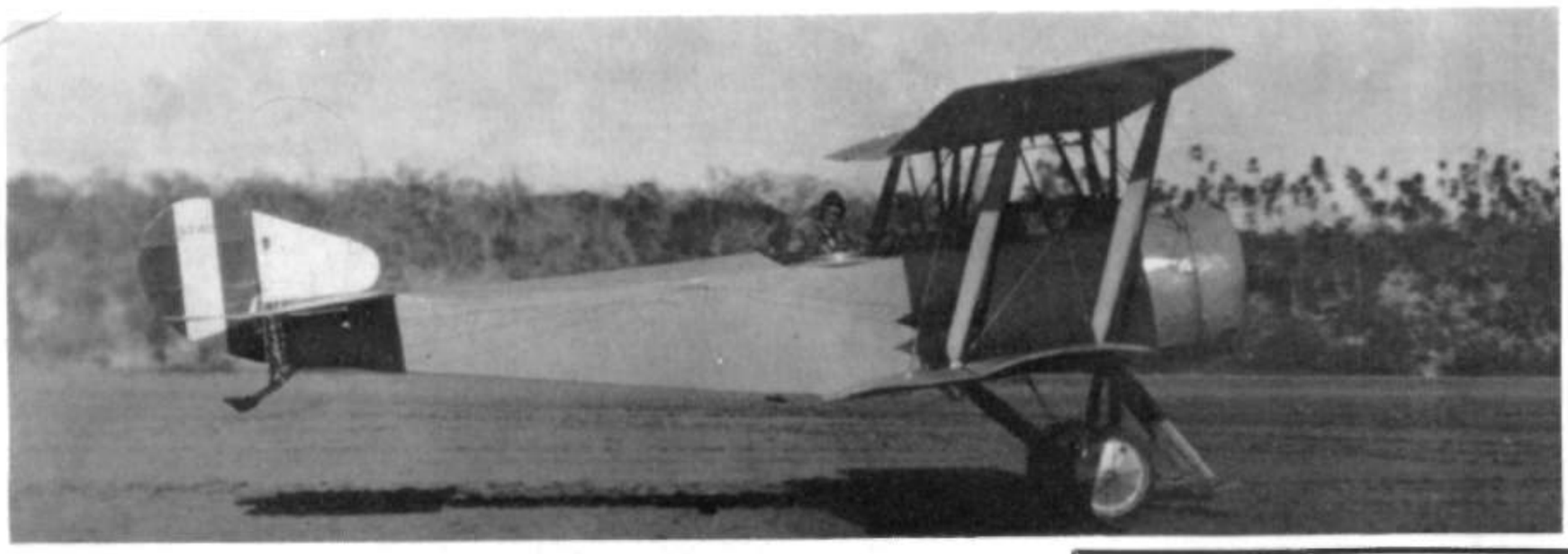
1½ Strutter, U.S. Navy, Fleet Ship Plane Unit, operating from battleships.



U.S.A.A.C., 4 wing positions, inboard.

U.S.A., 4 wing positions, inboard.

© WARD



A U.S. Navy 1½ Strutter A5740 takes off at Guantanamo, Cuba.
(Photo: U.S. Navy Official 442420)

Privately-owned 1½ Strutter in the U.S.A. The rudder bears the legend "T.W.1 Sopwith Cruiser".
(Photo: Peter M. Bowers)

No. 2 Wing, R.N.A.S.: N5086, N5224, N5517, N5527.
No. 3 Wing, R.N.A.S.: 9660, 9667, N5091, N5171, N5174, N5512.
No. 5 Wing, R.N.A.S.: 9382, 9394, 9406, N5082, N5093, N5114.
No. 5 Sqn., R.N.A.S. (part of No. 5 Wing): *9378, N5152, N5504, N5509, N5514* ("B 3"), *N5531.*
No. 6 Wing, Otranto: N5223, N5233.
No. 225 Sqn., R.A.F.: N5232.
F Sqn., R.N.A.S.: N5119, N5248.
H.M.S. Queen Elizabeth: A6006.
H.M.S. New Zealand: N5644.
H.M.S. Furious: B744.
H.M.S. Argus: F2211.

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The author desires to express his gratitude to Mr. L. Rogers for the loan of photographs, and to Mr E. F. Cheesman for the use of reference material.

SPECIFICATION

Power: 110-h.p. Clerget 9Z; 130-h.p. Clerget 9B; 135-h.p. Clerget 9Ba; 135-h.p. Clerget 9Bb; 145-h.p. Clerget 9Bc; 110-h.p. Le Rhône 9J; 135-Le Rhône 9Jby; 80-h.p. Le Rhône 9C.

Dimensions: Span 33 ft. 6 in., length 25 ft. 3 in., height 10 ft. 3 in., chord 5 ft. 6 in., gap 5 ft. 4¾ in., stagger 2 ft., dihedral 2 deg. 23 min., incidence 2 deg. 10 min., span of tail 13 ft. 6 in., wheel track 5 ft. 6 in., tyres 700 × 100 mm., airscrew diameter (Lang L.P. 7100) 9 ft.

Areas: Wings 346 sq. ft.; ailerons, each 13 sq. ft., total 52 sq. ft.; tailplane 35·5 sq. ft.; elevators 21·5 sq. ft.; fin 3·5 sq. ft.; rudder 7·25 sq. ft.

Armament: One fixed 0·303 in. Vickers machine gun with Scarff-Dibovsky, Vickers-Challenger, Ross or Sopwith-Kauper synchronizing gear; one 0·303 in. Lewis machine gun on Nieuport ring mounting, pillar mounting or Scarff No. 2 Ring Mounting on rear cockpit of two-seat version. Some aircraft of both single-seat and two seat versions had an additional Lewis gun mounted centrally above the upper wing. Normally the two-seat 1½ Strutter carried 300 rounds for the Vickers gun, five 97-round drums for the Lewis; the single-seat bomber could carry 500 rounds for its Vickers. The Home Defence single-seaters had one Lewis gun on a Foster mounting or twin guns on a double Foster mounting.

The two-seater could carry four 25-lb. bombs on racks under the lower wings; the normal load carried on anti-submarine patrols was two 65-lb. bombs. The single-seat bomber had internal racks in the underside of the fuselage. British 1½ Strutter bombers usually had four 65-lb. bombs but alternative loads (e.g., twelve le Pecq bombs) were sometimes taken.

The French two-seat 1½ Strutter could carry four bombs of 120 mm. calibre; the load of French single-seat bombers was either eighteen bombs of 120 mm. calibre, six of 155 mm., or twelve of 120 mm. plus two of 155 mm.

WEIGHTS AND PERFORMANCE

Aircraft	N5220	R.N.A.S.	R.N.A.S.	R.F.C.	A8194	Westland-built	N5112	French		
Version	Two-seat fighter	Two-seat bomber	Two-seat fighter	Two-seat fighter	Two-seat fighter	Single-seat bomber †	Single-seat bomber	SOP. 1A.2		SOP. 1B.1
Engine	110-h.p. Clerget	110-h.p. Clerget	130-h.p. Clerget	110-h.p. Clerget	110-h.p. Le Rhône	110-h.p. Clerget	130-h.p. Clerget	145-h.p. Clerget 9Bc	135-h.p. Le Rhône 9Jby	135-h.p. Clerget 9Bb
Weights (lb.)										
Empty	1,308	1,411*	1,305	1,259	1,281	1,643	1,316	1,159	1,159	1,323
Military load	—	—	157	160	160	—	344	265	265	445
Crew	360	360	360	360	360	180	180	353	353	176
Fuel & oil	—	—	328	370	404	—	502	264	264	472
Loaded	2,223	2,321	2,150	2,149	2,205	2,386	2,342	2,041	2,041	2,416
Max. speed (m.p.h.										
at 6,500 ft.	99·5	100	100	100·5	—	84	102	104	99	—
at 10,000 ft.	87·5	89·5	97·5	96·5	103	80	98·5	100	97	—
at 13,000 ft.	—	—	—	—	99	—	—	93	—	—
at 15,000 ft.	—	—	87	—	—	—	—	—	—	—
Climb to:	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
6,500 ft.	— —	16 27	9 15	10 50	10 30	— —	12 40	12 45	10 40	— —
10,000 ft.	29 30	35 0	— —	20 25	18 55	36 0	24 25	23 40	17 40	— —
15,000 ft.	— —	— —	41 50	— —	41 30	— —	— —	— —	— —	— —
Service ceiling (ft.)	—	—	—	—	16,000	—	13,000	—	—	—
Endurance (hours)	—	—	—	—	—	8	—	2¼	2¼	4¼

* *Weight quoted includes Vickers gun and bomb racks for four bombs*

† *With four 65-lb. bombs. Empty weight quoted obviously includes part at least of the military load.*

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